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In-patient accommodation: Options for choice

Health Building Note 04

MC0060

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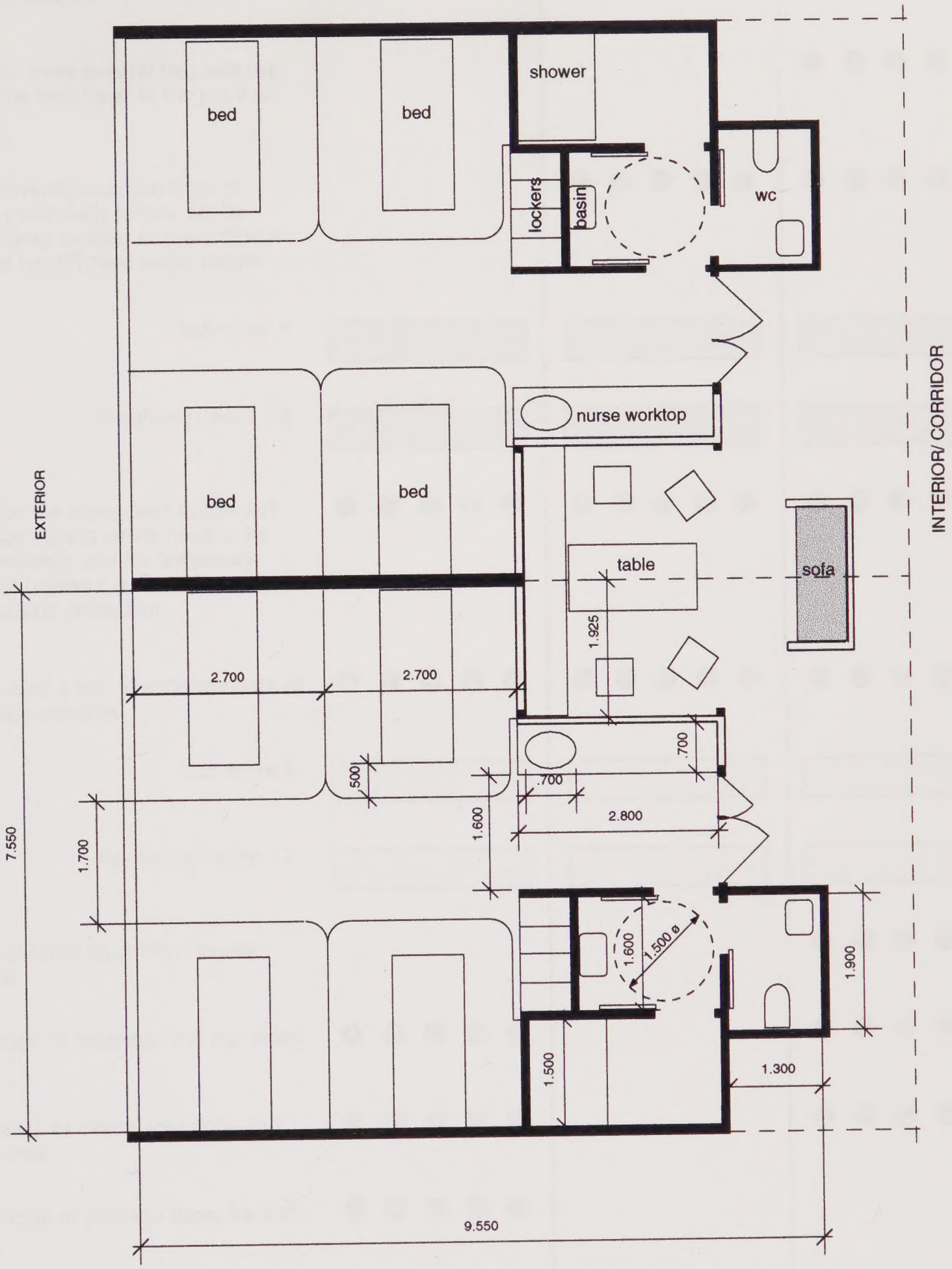
Errata:

- The illustration of a four-bed room layout below should have been included in Chapter 9, following page 66.
- Chapter 13, page 76: the "Health Gain" objective should not be scored for the criteria "Close access to beverage and rest areas for staff", please see revised illustration overleaf.



Bedrooms of four with shared WC, basin and shower (for disabled use).

1:50

Four-bed rooms

9.17 The four-bed rooms are planned with ensuite facilities to maximise views from all bed positions. Overnight stay facilities would be provided elsewhere. This arrangement includes a multi-purpose day/social space integrated with the circulation and promoting more social interaction between patients, staff and visitors.

Issue: Space

Criteria	People Centred	Objective: Health Gain	Resource Effective
Storage for patients' medicines, clinical supplies and personal belongings to be kept at the bedside	❶ ❷ ❸ ❹ ❺		❶ ❷ ❸ ❹ ❺
Storage for more general frequent use goods to be held close to the point of use			❶ ❷ ❸ ❹ ❺
For the prevention/containment of infection particularly MRSA; TB; by hand-washing facilities in every clinical space and by sufficient single rooms		❶ ❷ ❸ ❹ ❺	❶ ❷ ❸ ❹ ❺
Sub-score A			
Weighting Factor x 3			
Alcoves for the permanent holding of emergency trolleys which need to be readily available, and for temporary parking of trolleys e.g. food /linen, to avoid blocking circulation	❶ ❷ ❸ ❹ ❺	❶ ❷ ❸ ❹ ❺	❶ ❷ ❸ ❹ ❺
Space around a bed to accommodate all the bedside activities	❶ ❷ ❸ ❹ ❺	❶ ❷ ❸ ❹ ❺	❶ ❷ ❸ ❹ ❺
Sub-score B			
Weighting Factor x 2			
Storage of bulky equipment readily accessible			❶ ❷ ❸ ❹ ❺
Close access to beverage and rest areas for staff	❶ ❷ ❸ ❹ ❺		❶ ❷ ❸ ❹ ❺
Close access to clinical education and training area	❶ ❷ ❸ ❹ ❺		❶ ❷ ❸ ❹ ❺
Local storage of personal items for staff	❶ ❷ ❸ ❹ ❺		
Sub-score (no Weighting Factor)			
TOTAL SCORES			

Key ❶ = Very poor ❷ = Poor ❸ = Average ❹ = Good ❺ = Excellent

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Health Building Note 04

London: The Stationery Office

NHS Estates
An Executive Agency of the Department of Health

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About this series

The Health Building Note series is intended to give advice on the briefing and design implications of Departmental policy.

These Notes are prepared in consultation with representatives of the National Health Service and appropriate professional bodies.

Health Building Notes are aimed at multidisciplinary teams engaged in:

- designing new buildings;
- adapting or extending existing buildings.

Throughout the series, particular attention is paid to the relationship between the design of a given department and its subsequent management. Since this equation will have important implications for capital and running costs, alternative solutions are sometimes proposed. The intention is to give the reader informed guidance on which to base design decisions.

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Kingston Hospital NHS Trust

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Northwick Park NHS Trust

Trafford Hospital NHS Trust

Architectural research was undertaken by:

Medical Architecture and Art Projects Limited

A review of environmental and organisational issues in relation to in-patient accommodation was contributed by:

Dr R. Tope

The Design Options Evaluation Tool was developed by:

Social and Market Strategic Research Limited

Executive summary

This Health Building Note (HBN) provides guidance on the planning and design issues of hospital accommodation for people with acute illness or immediately before and after an acute intervention. It replaces HBN 04 (1990). The guidance in this Note can be used to inform the decisions to be made during the planning of a project or for evaluating a design solution.

It will provide a basis for making decisions on the nature and configuration of accommodation for any scheme from a relatively small upgrading programme to a major newbuild project.

The Note may also be used to stimulate discussion in the development of the business case and to review the level of need and the nature of in-patient accommodation in the light of local circumstances.

The changes in the environment for the delivery of healthcare over the past five years have indicated the need to review existing guidance. The drive for private financial investment along with rising public expectations and the opportunities presented by new clinical and information technologies suggest the consideration of different models of in-patient accommodation.

The difficulty of balancing the requirements for a facility that is technically suitable, comfortable for all users and with a reasonable cost to build, maintain and use is reiterated in all evaluations on hospital design.

When putting together the elements of provision required to create in-patient accommodation in an acute general hospital, local priorities and preferences in regard to clinical emphasis and organisation of care delivery play an important role in determining the nature and design of the facility.

This Note offers "mix and match" options for generating in-patient accommodation that accords with local priorities and with existing accommodation. The ultimate aim is to provide the reader with a selection of spaces that may be combined in different ways to provide an environment appropriate for today's needs and which may be readily suitable for tommorrow's.

The "mix and match" modular approach is particularly useful as new service patterns develop. It enables the easy aggregation of spaces to provide a variety of accommodation for in-patients either as part of a specialist patient-focused department, day surgery and small in-patient areas, an admission/short stay facility in association with an accident and emergency department or a large in-patient floor.

There are five modules of accomodation:

- bed and sanitary facilities;
- patient support facilities;
- storage spaces;
- utilities;
- administration areas and staff facilities.

In addition, essential complementary and optional accommodation is offered.

Single-bed rooms or four-bedded rooms all with ensuite facilities are described as the focus for activities associated with in-patient care to meet the standards of the Patient's Charter.

The multi-bed room cannot afford privacy or discussion of personal or clinical matters or for clinical treatment. If multi-bed rooms are used there must also be quiet separate rooms for consultation and examination or treatment and for one-to-one discussions, interviews or education.

All single-bed rooms and multi-bed rooms should have ensuite WC and shower. Ideally all sanitary facilities should be accessible and manageable by people with physical or sensory disabilities. The increasing acuity of illness of in-patients means that a great proportion of patients may use a wheelchair or require assistance during their hospital stay even when not normally wheelchair users.

Easy access, convenient location and good design of WCs and other sanitary facilities are of great importance to patients, for all these assist the maintenance of independence to reduce the incidence of side effects from immobilisation. WCs should be clearly identified, and designated for use by people of one gender at a time, as needs fluctuate.

A range of different organisational arrangements may be encompassed.

The principle of devolved clinical care management to the patient bedside with services and supplies located as close as possible within a cluster is enabled by the modular approach.

Clusters may be aggregated to:

- provide a greater clinical grouping, flexed use, clinical overview and variable staffing cover over the 24-hour period;
- provide shared back-up services and facilities;
- enable facilities and bed management over a group of clusters for an economy of scale.

The content of different modules and the levels of aggregation attempt to balance the conflicting demands for a clinically suitable environment, a people-centred one and for efficient use of staff and capital resources. A bed module requires to be complemented by four supplementary modules.

There is a choice of two eight-bed cluster modules which enable beds to be provided in an arrangement of 50, 75 or 100% single-bed rooms.

The business case for building and refurbishing in-patient accommodation hinges, as do all business cases, on the demonstration of a financial return on the investment as well as a qualitative improvement in the facility.

This return may be generated from an increased effectiveness of in-patient care, an increased efficiency by which in-patient care is delivered and/or by an increase in the volume of business that may be achieved.

Measuring effectiveness and efficiency of in-patient care is difficult with the number of variable factors that operate. Proxy measures for effectiveness of care include length of stay, hospital acquired infection rate, and untoward patient incident. Efficiency measures include the turnover interval, the bed utilisation rate and staff utilisation.

Some of the hospital accommodation which has developed over the last 100 years and is still in use today is described. This existing stock provides the starting point for upgrading and refurbishment to modern standards. Examples where this has happened are examined as case studies to explore the potential of old stock.

A background of research and study material on design and environmental issues relating to in-patient healthcare is given. This will support debate at project and design team level to arrive at appropriate decisions in the local circumstances. It will also enable team members to find a route to more detailed comprehensive research material.

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1. Scope of Health Building Note 04

1.1 This Health Building Note (HBN) provides guidance on the planning and design issues of hospital accommodation for people with acute illness or immediately before and after an acute intervention. It replaces HBN 04 (1990). The guidance in this Note can be used to inform the decisions to be made during the planning of a project or for evaluating a design solution. The term "ward" for a physical area has been deliberately avoided as the term has become synonymous with a particular organisational structure and its use sometimes appears to constrain the development of other organisational structures.

1.2 We expect the Note to be used most as a handbook for project and design team members when planning in-patient accommodation. It will provide a basis for making decisions on the nature and configuration of accommodation for any scheme from a relatively small upgrading programme to a major newbuild project. Whatever the professional background of the reader we hope the Note will be easy to follow to find specific information in context.

1.3 The **style** and **format** differ from earlier documents in order to offer information in a readily accessible manner at different stages of the planning and design process.

1.4 The Note may also be used to stimulate discussion in the development of the business case and to review the level of need and the nature of in-patient accommodation in the light of local circumstances.

1.5 Before the guidance in this document is sought by project teams there will have been a full exploration and analysis of the acute care process, and the extent to which substitution to in-patient care for some or all elements of the process may be made. This will be reflected in the business case option appraisal.

1.6 This substitution might require physical space elsewhere within the hospital complex, or in association with primary healthcare facilities. It may be by in-house service options or be on the basis of a contract with another agent.

1.7 Examples of additional and/or different physical spaces are: pre-admission clinic areas in association with out-patient clinic areas or in-patient accommodation; medical investigation units; day surgery units. Low dependency or self-care units may also have a use for certain categories of patients.

1.8 Services for people with acute illness may be delivered in a variety of locations. These include care at home managed by primary healthcare, community health service or hospital outreach teams; in day facilities local health centres, community hospitals or acute hospitals or in in-patient accommodation in community, acute general or specialist hospitals. This Note offers guidance for adult in-patient accommodation in acute general hospitals. Guidance on facilities for other modes and types of care are provided in other documents in the Health Building Note series.

The rationale for review

1.9 There have been profound changes in the organisation, delivery and practice of bedside care since the last issue of guidance from NHS Estates on the adult acute ward, in 1990. In clinical practice new technologies have resulted in an in-patient population which has a rapid turnover with a high number of interventions and a high dependence on services (medical gases, electrical/electronic) and on staff.

1.10 The emphasis on the efficient use of resources has led to high bed utilisation not simply to maximise the use of the bed itself, but to gain the greatest value from the more costly elements of the hospital complex, the diagnostic and therapeutic facilities, imaging and operating departments.

1.11 The organisation and use of the most valuable resource – the knowledge, skills and expertise of staff – is being scrutinised, reviewed and subjected to new standards. This includes the working hours of doctors, the removal of the untrained worker, etc. Different organisational practices are being implemented: multi-disciplinary teams, care groups, multi-skilled generic workers, and professional accountability with flat management structures to name but some.

1.12 The use of computerised systems to hold, process and transfer patient information both digitally and by video at every point of clinical activity is rapidly becoming a reality – reducing the need for personal staff-to-staff interaction, proximity to specialised inputs and a multiplicity of paper-held records.

1.13 The most notable change in today's society is the public's own increased expectations about the quality of the delivery of services – whether in the public or private sector. These expectations are reflected in the Patient's

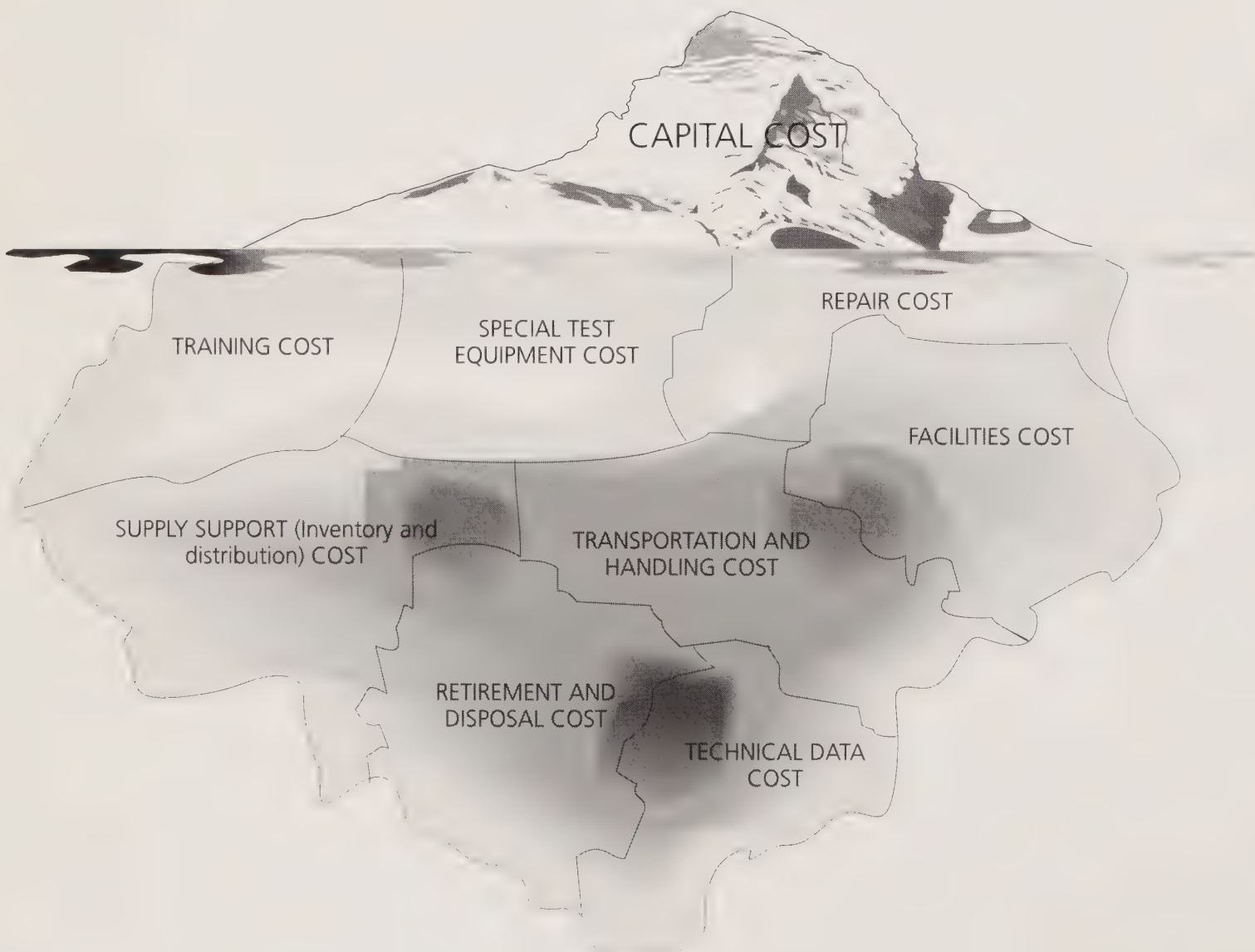
Charters of the Department of Health, Welsh Office, Scottish Office and Department of Health and Social Services Northern Ireland, which set out people's rights in the NHS and the minimum standards to be expected from all health services.

1.14 People attending a healthcare facility for assessment, diagnosis, treatment or care expect:

- to be able to find their way around the facility easily from clear signposting;
- to have greater consultation and discussion (in confidence) with those responsible for their health care;
- that interventions or bodily functions will be performed in private and that they will not be visible to/within earshot of others;
- that there will be sufficient flexibility to enable the patient's religious and cultural beliefs to be upheld;
- that the environment will be not only safe, clean and hazard-free, but will have a pleasant ambience.

It should be possible for people to be able to alter the environment to suit themselves. All these expectations have an impact on in-patient accommodation.

The cost iceberg



Balancing the priorities

1.15 It has always been recognised that compromises have to be made in designing in-patient accommodation to produce a design solution that not only satisfies functional requirements but is also economical in both its capital and running costs.

1.16 At the most practical level, site factors constrain design. The form, layout and location of existing buildings and any phasing and decanting arrangements together with the development control plan will determine the scope of redevelopment proposals.

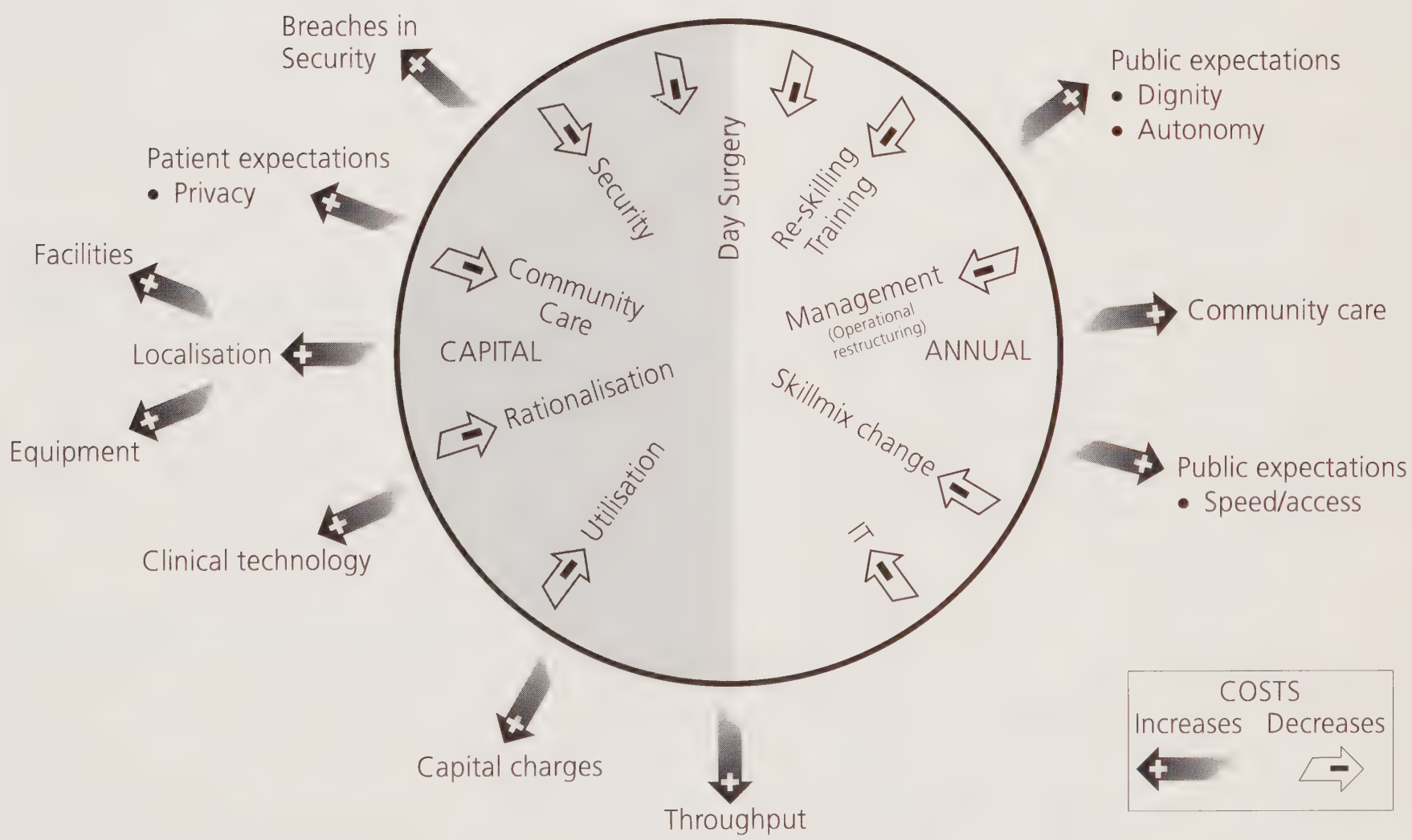
1.17 Capital cost is the most commonly quoted constraint on the provision of accommodation. Whilst this is certainly true in terms of initial outlay, the direct capital cost is small in terms of the life cycle costs of a facility itself. Life cycle costs include running repair and replacement costs.

1.18 The difficulty of balancing the requirements for a facility that is technically suitable, comfortable for all users and with a reasonable cost to build, maintain and use is reiterated in all evaluations on hospital design.

1.19 The diagram below shows the impact of different factors on the capital and revenue NHS "purse". Inward driving arrows show factors which reduce cost, outward driving arrows those that increase cost. A factor may simultaneously reduce capital cost but increase revenue cost and vice versa.

1.20 Nevertheless, in the balance between economy, the provision of suitable conditions for medical care and the amenity of the patient, the former has become predominant. The principal concern in many capital projects has been the reduction of capital cost with less regard to the consequent impact on resources, particularly staff, utilisation, or on the environment for the patient.

Balancing the costs of health care



1.21 The balance and the interface between these principles has more recently been portrayed by the Welsh Health Planning Forum in its consideration of a strategy for health services for Wales. The Forum emphasised that services should seek to maximise health gain, be people-centred and resource effective. Using these headings to review planning and design enables an explicit recognition of the compromises being made between the three principles. This approach is the basis for the development of assessment criteria later in this document.

1.22 Influences for change – often summarised as political, economic, social and technological drivers – fall into two categories: those which bring about a desire to change; and those which enable change.

1.23 The issues for this handbook behind the desire for change are those which have given rise to an explicit expression of dissatisfaction with the in-patient environment, as well as with the opportunities of new technologies – the enabling factors – to overcome some of the past constraints and limitations on hospital design.

1.24 The quality of the in-patient environment has become a cause of greater concern in recent years, in line with growing public expectations reflected in the Patient's Charter. Complaints to the Patients' Association over 'mixed-sex' wards have increased annually since 1992.

1.25 Adequate space in association with the bed area was a specific target for criticism by Peter Scher in 'Patient Focused Architecture' (1996). Two King's Fund reports in 1993 also expressed concern that the recognition of human needs of patients were being relegated in the creation of technical efficient facilities.

1.26 The impetus towards patient empowerment – the desire to retain control and independence – and its frustration by the institutionalising effect of existing accommodation; the difficulty for patients and relatives of establishing the identity of the person with responsibility for their day-to-day care and the organisational framework of that care are all matters of general concern to health services providers.

1.27 Among the opportunities for change in the concept and design of the hospital is the rapid advance of information technology. Adjacency of some areas with others becomes less significant when information is accessible throughout a system. The use of technology to manage and manipulate information relating to patients also supports organisational change in professional practice. Whilst hands-on skills and expertise cannot yet be substituted, the body of up-to-date professional knowledge is no longer limited to committed professionals but is widely available to anyone – including the lay public – through computer-held databases.

1.28 Telemedicine in its widest definition is "the investigation, monitoring and management of patients and the education of patients and staff, using systems which allow ready access to expert advice and relevant patient information, no matter where the patient is located". This will have a significant impact on the configuration of healthcare services, within the hospital as well as between one location and another.

2. The desirable environment

2.1 The essential message is the ever-increasing rapidity of change in the function and utilisation of hospitals. Flexibility in use on both a day-to-day basis and over time is the key to economic, efficient provision. The capacity to accommodate patients with different needs simultaneously and over a period must be the first criterion.

2.2 In the light of today's concerns a greater emphasis on the human needs of patients is required without jeopardising health outcome or a loss to the efficiency of the hospital.

2.3 Different sets of criteria have been used by authorities in assessing and evaluating hospital design overall. There is a close similarity between criteria regardless of the source and underlying principles and the criteria are readily applicable to in-patient areas alone, to ensure the appropriate balance between the efficiency of the hospital, the effectiveness of health care and that the human needs of individuals are met.

2.4 The following table draws on the findings of patient surveys, and on criteria used by the King's Fund, Peter Scher, Jain Malkin, and earlier Health Building Notes. It summarises the key features of a desirable environment.

Key features of a desirable environment

Space for	
	clinical activity at the bedside
	clinical activity elsewhere
	storage/display of patients' possessions
	storage of bulky equipment
	staff support and training
	social support of patient
Suitability of	
	services and supplies at the bedside for clinical activity.
	access to and within area for physically and sensorally impaired people
	services to enable personal communication by patient
	services to enable direct admin/clinical communication from the bedside
	a reassuring, stress reducing, environment
	a safe and hazard free facility
Privacy	
	during clerking and clinical discussions between patient and staff
	during clinical treatment
	for bodily functions and personal care
	for personal discussions and telephone calls
	for staff communications
	for staff rest and beverage breaks
Choice, control, comfort	
	to be alone or in company, including visitors
	of temperature, ventilation, lighting and sound
	of diversion, outlook, entertainment
	with access to beverages for patients and relatives
	with local storage of personal belongings of staff
	with access to the outside world

2.5 A particular focus of concern has been the "mixed-sex" ward in which the needs of patients for privacy and dignity have taken a lower priority than the interests of efficiency and clinical effectiveness. Although no fixed definition has been given for this, it is assumed to be one where men and women may be in adjacent beds and/or use common washing and sanitary facilities. This form of use of accommodation has insidiously become widespread, as the drive for the efficiency represented by high levels of occupancy and the demand for high throughput generated by the waiting times initiatives have taken effect. Ad hoc comment, surveys and pressure groups all emphasise the public distaste for the "mixed-sex" ward concept, particularly non-segregated sanitary facilities. This is of such concern that our guidance has been developed with a view to providing greater opportunity for segregated sanitary facilities.

2.6 However a range of surveys and studies demonstrate that concerns embrace many more issues than the lack of privacy and dignity associated specifically with 'mixed-sex' wards. The levels of sensory stimulation — noise in particular — disturbing rest and sleep, inadequate numbers of bathrooms and lavatories, inability to alter lighting and temperature are among those issues repeatedly occurring. Capturing local views and wishes at the outset, throughout the design stage and when evaluating the finished design is important: people value the opportunity to comment at all stages of development.

2.7 First impressions are of fundamental importance in influencing behaviour. The design and furnishings of the reception and waiting spaces should be warm and welcoming with a carefully chosen decor, floor coverings, pictures and plants. This feeling of warmth and welcome should be continued throughout the accommodation.

2.8 The shape and appearance of rooms also affect people. Rooms which are square or nearly square are preferable for most purposes. Long, narrow tunnel-like rooms, L-shaped rooms and rooms which are small, internal, badly lit or poorly ventilated should be avoided.

2.9 In recent years more emphasis has been given to the provision of a pleasing decor, as well as to the incorporation of visual art into the hospital environment. There is a danger that these elements of design are considered at a late stage in the planning process as "extras" which may be trimmed or jettisoned as costs approach a budget ceiling.

2.10 There is sufficient evidence to demonstrate the contribution of art and decor to the provision of an environment which, reducing the physical and emotional stress of patients and staff, justifies its integration into a scheme rather than as an afterthought. Moreover, the consideration of the desired ambience in the early stages enables structural and detailed design decisions throughout the project to be made in context, for example the location of windows to make the best of an outlook or the architectural detailing of window shape and depth of reveals, or installing external and internal blinds and curtains to reduce glare and heat gain.

2.11 Art need not be limited to pictures on a wall. It may also include murals, prints, photographs, sculptures, decorative tiles, ceramics and textile hangings. Works of art by local artists and craftspeople may lend a special identity to the facility.

2.12 Well designed decor with integrated and co-ordinated furniture, fittings, floor coverings, colour and lighting schemes will contribute to the well-being and reassurance of patients.

2.13 The use of colour and art to identify particular routes and room "way marking" assist in the reduction of unnecessary, obtrusive signs. Certain doors, eg fire exit doors, will require conventional labelling. Where signs are used they should not detract from the overall ambience, and should be simple yet sufficiently explicit to be understood without confusing.

2.14 Access to the outside world is most likely to be visual. Sill heights of windows should allow seated people to see outside. External landscaping is often of special value. Particular attention should be paid to the location of windows in relation to beds with regard to:

- draughts;
- views.

2.15 The means for patients to control curtains or blinds for privacy should therefore be included (motorised curtains are an option for non-ambulant patients). The bed position to provide views of nature – such as landscaped areas, courtyards and so on – is an important consideration.

2.16 Upper storey windows will have greater maintenance and draughtproofing problems, particularly in high-rise buildings. It has been demonstrated that lower storey windows provide lower daylighting levels compared to an equivalent area on an upper storey. The quality of view can vary considerably between upper and lower storeys and window sill or head heights need to take account of the relative disability of the occupants, the mechanical services, ground conditions etc.

2.17 All bed areas should receive natural daylight and sunlight. Where artificial lighting is provided in spaces where patients are examined or treated it should enable changes in skin tone and colour to be clearly defined and easily identified. The quality of lighting will need to be considered if video consultation is likely to take place.

2.18 Fixed luminaires should not be sited immediately above positions where people lie on a bed, couch or trolley. This applies to all spaces where people are consulted, examined and treated.

Courtyards

2.19 Well proportioned courtyards enable rooms to receive natural daylight and ventilation in addition to providing a stimulating outlook from bedrooms, day spaces and staff areas. Layout and planting can help to preserve privacy in surrounding rooms.

2.20 It is desirable to provide access to courtyards wherever possible and thresholds should be designed to facilitate access. Seating should be provided. Access for maintenance and cleaning should be so that patients and staff are not disturbed. Adequate water points, power points and lighting, if necessary, should be provided in all courtyards. *Courtyards should not be infilled.*

Environmental control, diversion and entertainment

2.21 As noise is such a significant issue for patients, design which separates busy activity areas and patient bed spaces and the use of sound-absorbing materials should be adopted. Partitions between areas for confidential discussions must also be sufficient to prevent overhearing.

2.22 Consideration should be given to the provision of television and radio facilities. Entertainment centres with individual TV, video and stereo headphone systems may be provided. Televisions may be suspended from the ceiling, mounted on walls, or placed on mobile units (although care must be taken to ensure that trailing wires do not present a hazard). In order to avoid disturbance to other patients, sound outputs from radios, televisions and other auditory equipment should be via headphones only. Conduits for television/video and background music system outlets should be provided.

Practicality

2.23 In determining the locally desirable environment the level of activity and the amount of likely wear and tear must be considered. Well planned areas that allow the easy passage of heavy, bulky equipment, patient beds hung with medical equipment, food trolleys and waste skips, are the first defence against damage.

2.24 Damage is likely to result from the use of lightweight (often less robust) building materials. Cheaper initial building cost must be weighed against the life cycle costs of repair and replacement. Measures to minimise damage can be taken in the form of protective corners, buffers and plates, and the proper continuation of floor surfacing, ie strong screeds and fully bonded floor coverings. However careful integration and co-ordination of these elements within an overall interior scheme to create a non-institutional ambience will be required. Protective devices should be capable of easy renewal to maintain the appearance.

Maintenance and cleaning

2.25 Materials and finishes should be selected to minimise maintenance and be compatible with their intended function. Building elements that require frequent redecoration or which are difficult to service or clean should be avoided. Special design consideration should be given to entrances, corners, partitions, counters and other elements which may be subjected to heavy use. Wall coverings should be chosen with cleaning in mind.

2.26 Design should ensure that it is possible for cleaners to have easy access to the inside and outside of windows.

2.27 A framework based on the table at paragraph 2.4 by which a project team may assess the capacity of a design solution to meet the strategic aims /intentions of the institution and the objectives of the investment in in-patient accommodation is given in the design options evaluation tool in chapter 13. Space needs and services are discussed in the next chapter.

3. Details of room spaces

3.1 When putting together the elements of provision required to create in-patient accommodation in an acute general hospital, local priorities and preferences in regard to clinical emphasis and organisation of care delivery play an important role in determining the nature and design of the facility. As has been discussed earlier, the constraints of existing structures limit the possibilities. Similarly, the organisation and management of the accommodation may at first appear to be conditioned by the extent to which it is locked into wider organisational and personnel structures. The case studies show that for some, modification provides the opportunity to pilot different models of care.

3.2 Whilst this document will not discuss the relevant merits of different organisational models, nevertheless it is necessary to recognise that different models of organising patient care are being developed and that the physical environment should enable and not inhibit a range of organisational models to be practised.

3.3 After considering individual spaces, this Note offers "mix and match" options for generating in-patient accommodation that accords with local priorities and with existing accommodation. The ultimate aim is to provide the reader with a selection of spaces that may be combined in different ways to provide an environment appropriate for today's needs and which may be readily suitable for tomorrow's.

3.4 The need for some traditional spaces are challenged, new ones proposed. The geometries of design are explored to identify the advantages and disadvantages of different configurations.

3.5 The "mix and match" modular approach is particularly useful as new service patterns develop. It enables the easy aggregation of spaces to provide a variety of accommodation for in-patients either as part of a specialist patient focused department, day surgery and small in-patient areas, an admission/short stay facility in association with an accident and emergency department or large in-patient floor.

3.6 The starting point for the consideration of spaces to generate the modules is the person-centred, service-focused bed space. From decisions taken on the nature of the bed space flow consequences for spaces for clinical treatment and storage, staff workstations, patient social spaces and meeting/discussion/interview spaces.

3.7 The levels at which management communication and information systems operate, and the extent to which these alter throughout a 24-hour period influence the location of the clinical and administrative areas. Allied with this are decisions on staff facilities.

3.8 There are five modules of accommodation:

- bed and sanitary facilities;
- patient support facilities;
- storage spaces;
- utilities;
- administration areas and staff facilities.

In addition, essential complementary and optional accommodation is offered.

3.9 Modules may be aggregated as packages for the level of provision required.

Bed and sanitary facilities

3.10 In an acute hospital today, the volume of activities that centres on the patient in or at the bedside are increasing. The period that a patient spends in hospital is shortening, and becoming limited to that part of a package of healthcare which requires active interventions for diagnosis, treatment and immediate recovery. The level of dependence and disability of patients once interventions begin until discharge, is relatively high; movement by staff around the patient may be considerable and there is likely to be a high use of equipment and aids at the bedside. The activities and the patient's response to interventions are recorded, increasingly on computer held databases. Relatives and visitors are more involved and prepared to assist in patient care and support.

3.11 There are three distinct categories of direct activities that take place:

clinical treatment and care:

- admission, with the intimate discussion of personal matters;
- specific medical and nursing interventions and observation;
- rehabilitation;

- teaching and training the patient and relatives;
- informing, discussing, listening and advising.

personal care and maintenance:

- eating, drinking, washing and toileting;
- entertainment/diversion, reading, watching the television;
- socialising;
- receiving visitors.

support activities:

- preparation of clinical procedures;
- maintaining records;
- holding stores;
- communicating;
- developing staff skills.

3.12 The diagram below shows the zones to enable these activities to take place around a bedspace in a single-bed room. The arguments for adopting single-bed room accommodation much more widely than at present are becoming more and more persuasive.

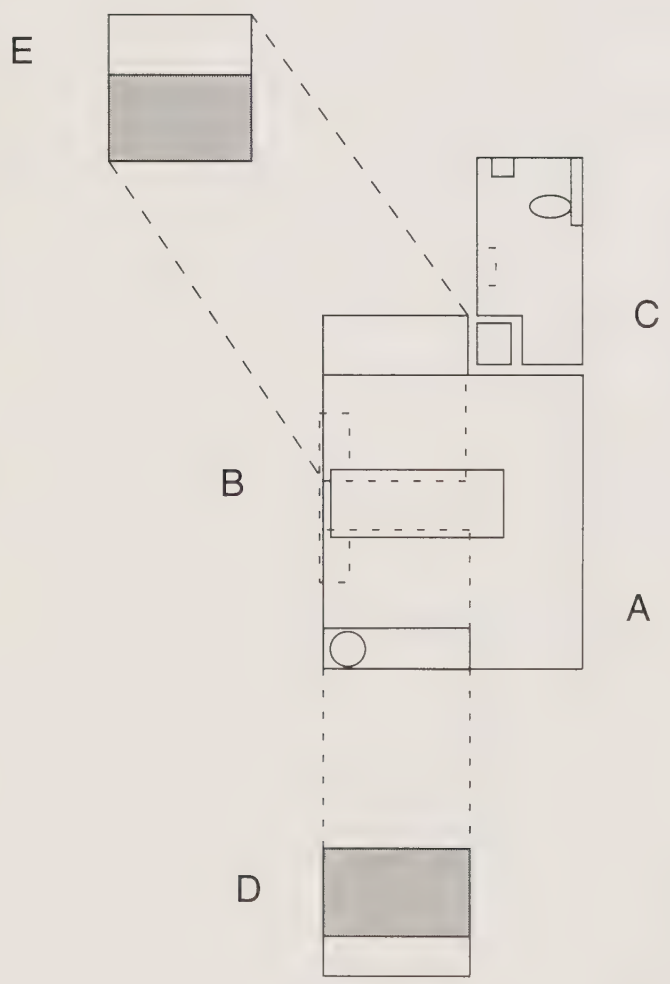
3.13 The single-bed room will be large enough to enable a wide range of bedside activities:

- family involvement in the care team;
- bedside diagnostics and the recording of information;
- local ancillary and support services at the bedside;
- clinical support;
- family support.

3.14 It will allow procedures to be carried out from either side of the bed with adequate circulation space so that medical emergency teams and equipment can gain access to the patient. There will be adequate space for moveable furniture and unobstructed access for wheelchairs, as well as space to accommodate overnight visitors.

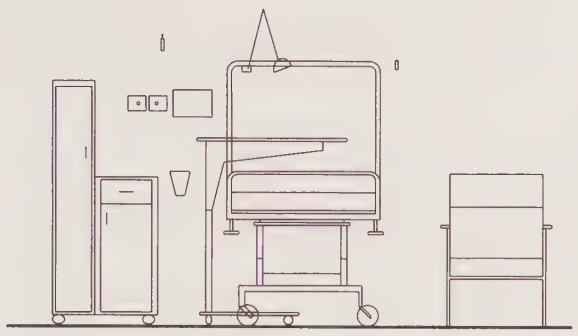
3.15 The addition of clinical and family support zones to the bedspace will result in an increase in size from the previous single-bed room of 14m^2 (HBN 04, 1990).

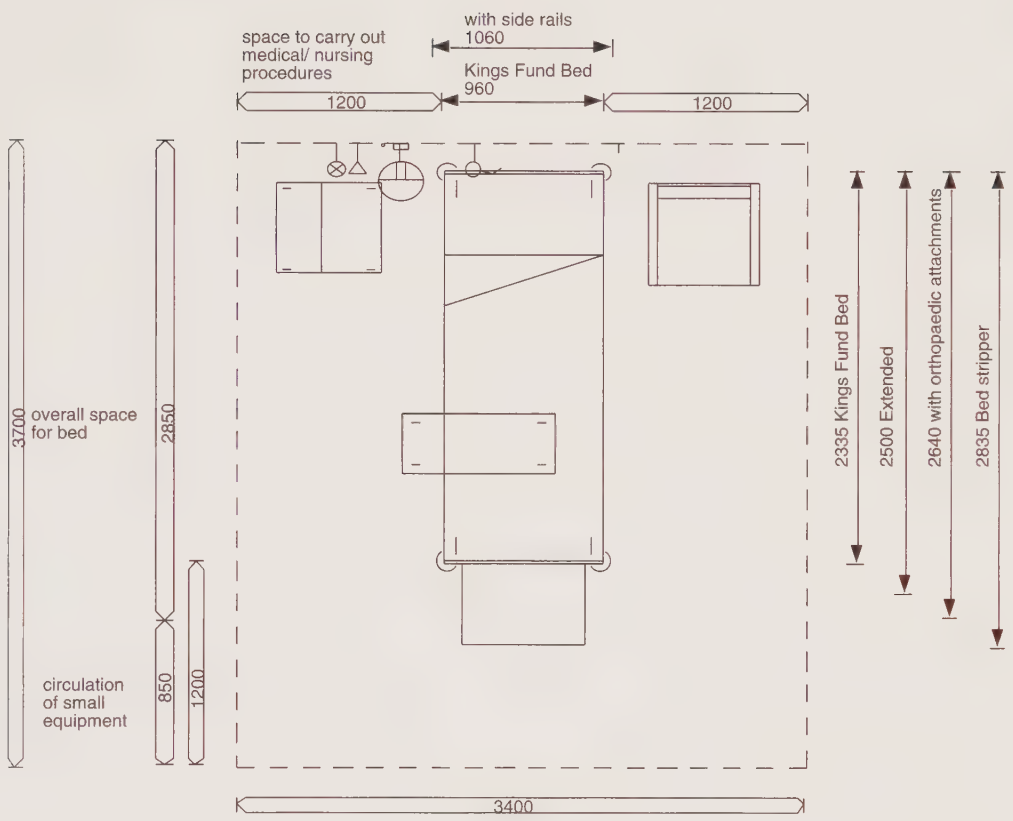
Five activity zones within a bedroom



A Core bedspace
B Bedhead services
C Sanitary facilities
D Clinical support
E Family support
Circulation

Core bedspace





Dimensions are based on a standard Kings Fund bed including all extensions. Easily understood controls for the bed, TV, lights, and nurse call with pressure-sensitive control buttons, accessible with either hand, should be provided.

Minimum clearance of 1200mm should be allowed on both sides of the bed for clinical and support activities. This clearance should be maintained at the end of the bed whilst allowing for bed extensions and for tilting.

3.16 The alternative to a single-bed room is a multi-bed room, in which the different activity zones move to a greater or lesser degree further away from the bedside, and may be shared to support all the beds in the multi-bed room. A preference is emerging for a four-bedded room with designated sanitary facilities for each bedroom, accessed not from within but from just outside the sleeping area. Each patient has a corner to provide a "home base", the distance to washing and lavatory facilities is still short, but has the advantage of not being under the gaze of one's immediate fellow patients.

3.17 Whether in a single- or a multi-bed room all bed spaces should be provided with:

- a variable-height bed;
- a bedside locker (or locker wardrobe);
- an overbed table;
- an easy chair and space for an additional stacking chair;
- a bedhead luminaire;
- a bedhead services panel incorporating:
  - electrical socket outlets;
  - luminaire control switch;
  - staff call reset button/indicator lamp;
  - staff/staff emergency pull switch;
  - socket for patient handset;
  - patient handset storage bracket;
  - radio/TV;

– stethoscope headset outlet (may be on handset control unit);

– telephone/call monitoring;

- a patient handset control unit incorporating:

  – staff call button;

  – reassurance light;

  – luminaire switch;

  – radio/TV volume control knob;

  – radio/TV selector switch;

- oxygen and vacuum outlets;
- personal storage:

  – a wardrobe with clothes hangers, lockable drawer, hooks, space for suitcase, shoes and boots is required. A further lockable drawer for medication should be incorporated. Space will be required for storing:

  – toiletries;

  – reading material;

  – writing supplies;

  – radio;

  – flowers;

  – cards;

  – non-perishable food;

- a work station with a computer terminal;
- storage for a days' supply of linen and surgical goods/supplies.

These provisions are necessary as the basis of a desirable environment.

3.18 Where not in a single-bed room each bedspace should not be less than 2.9m x 2.9m and be separable by curtains to provide a degree of privacy. Curtains should be shadow-proof, flame retardant, and if suspended from ceiling track, have a net or scalloped inset heading to ensure ventilation and light when drawn.

3.19 Each multi-bed room should include a wash-hand basin for staff use. A workstation with a computer terminal and storage for a day's supply of linen and clinical goods is required for each multi-bed bay. A single workstation will suffice for a group of beds.

3.20 Project teams should decide in consultation with the local fire authority whether multi-bedrooms should or should not be fitted with doors for fire safety reasons, for example, to limit the spread of smoke. Doors reduce disturbance from noise and increase privacy. On the other hand, observation is reduced and movement of patients and staff is hampered when doors are closed. If the local fire authority advise that doors are not necessary and it is decided not to include them, then the design of the entrance should be such that it is possible to fit doors later without affecting the use of space on each side.

3.21 Each multi-bed room should include or have easy access to a sitting area, as the majority of patients, although highly dependent, are encouraged out of bed.

Sanitary facilities

3.22 All single-bed rooms and multi-bed rooms should have en-suite WC and shower. The increasing acuity of illness of in-patients means that a great proportion of patients may use a wheelchair or require assistance during their hospital stay even when not normally wheelchair users. For greatest flexibility of use all sanitary facilities should be accessible and manageable by people with physical or sensory disabilities with or without assistance.

3.23 Easy access, convenient location and good design of WCs and other sanitary facilities are of great importance to patients, for all these assist the maintenance of independence to reduce the incidence of side effects from immobilisation. WCs should be clearly identified, and designated for use by people of one gender at a time, as needs fluctuate.

3.24 In each single-bed room there should be a WC and a shower as well as a wash basin for use by staff as well as patients. Non-tap wash basins with motion sensors may be considered. There should also be a holder for a bedpan and a hose in the WC to allow rinsing of the bedpan after use. For economy of space these facilities should be contained in one compartment per bedroom. It must be possible for sani-chairs to be pushed easily and without turning, into WCs. The wet shower area of the compartment should be separated by a curtain from the remainder which should serve as the drying area. There should not be a step between the wet and dry areas, but there is a requirement for sufficient slope of the floor to the outlet, so as to assure proper drainage and prevent spillage of water into the dry areas.

3.25 In multi-bed rooms it is convenient to provide a separate WC compartment and a shower compartment both opening off a lobby from the bedroom. Thus two people may use the facility at once and one person showering does not prevent others from using the WC. However privacy and dignity must be ensured with the provision of appropriate security devices, locks etc. They should be designated for use by one sex at a time. Each compartment should have a wash basin. In the shower compartment there must be no step between wet and dry areas (the latter will contain the wash basin) but there must be sufficient slope to confine the water to the wet area. Both compartments should permit assisted use when required.

Shower and bathrooms

3.26 As public experiences widen and attitudes change, there is a greater acceptance of showers. The space economy of showers particularly when compared to assisted bathrooms is considerable. Apart from space, showers are efficient users of water and energy, easier and safer in use for both patients and staff and are said to be less likely to be a source of infection. These factors should be considered by project teams in coming to a decision on the nature of washing facilities to be provided.

3.27 If centrally located, WCs should not be more than about 12m from bed areas or the day room. The following points should also be taken into account:

a. all WCs must have provision for handwashing;

b. as patients may wish to use the WC before or after bathing or showering, project teams should consider providing a WC and wash basin in each bathroom/ shower room;

c. at least one assisted WC should be so designed that staff can assist the patient from either or both sides.

3.28 A member of staff must be able to leave the WC without exposing the patient to view, and if privacy cannot be ensured by room design then an internal curtain or screen must be fitted.

3.29 Where a bath or shower is provided en-suite to each multi-bed room, no additional bathing facilities, other than an assisted bathroom or assisted shower, should be required.

3.30 Patients using an assisted bathroom may arrive in a wheelchair or on a mobile hoist. Staff assist the patient in bathing and associated activities, and may also give treatments. A variable height peninsular bath is essential. Space must be sufficient to accommodate three staff, and permit the manoeuvring of support equipment such as a hoist. The room should also contain a WC, wash basin and possibly a bidet.

3.31 The cord of the patient staff call system should be easily identifiable, accessible from the wet area, and descend far enough to be within the reach of a patient who has fallen or collapsed. The floor surface should be slip-resistant. The gradient of the floor of the wet area should ensure effective drainage to the waste outlet to prevent ponding. Ventilation should preclude excessive heat, humidity and odours.

Bidet

3.32 Provision of a bidet in the assisted bathroom or assisted shower should be considered; additional bidets may be required in wards serving particular clinical specialties.

Patient records

3.33 As with the single-bed room, the closer the facilities for maintaining records and holding supplies, the less time is spent by staff in travelling to and fro. A work station and storage trolley bay for linen and clinical supplies should be within or closely associated with the multi-bed room.

Patient support facilities

3.34 The multi-bed room, however, cannot afford privacy for discussion of personal or clinical matters or for clinical treatment. If multi-bed rooms are used there must also be quiet separate rooms for consultation and examination or treatment and for one-to-one discussions, interviews or education.

Consultation/examination room

3.35 A consultation/examination room may be used for procedures of a clinical nature, as well as for pre-admission assessment clerking and examination of patients on admission. A computer terminal should be provided at the desk to enable direct input to a patient's record, ordering investigations etc.

3.36 If a patient who has not been allocated a single-bed room requires treatment, it may take place here. The patients may be ambulant, in a wheelchair, on a trolley, or on a bed; the door width must be sufficient to permit their passage. Door swings should not impede movement or activities within the room. All-round access to the patient on the examination couch is essential (which should be screened to ensure privacy). The examination couch must be mobile so that it can be moved out of the way to allow access to patients who need to be treated on a patient trolley or bed.

3.37 A desk and chairs for consultation are required. A small cupboard with a worktop, for the storage of items of equipment and sterile packs, is desirable.

3.38 This room should be equipped with terminal units for oxygen and for vacuum, an X-ray viewing facility, a mobile lamp, and clinical hand washing facilities. Clinical-quality colour rendering light sources should be provided with appropriate dimming/enhancing facilities and walls, ceilings and floors should be of suitable colour and reflectancies.

Interview/sitting room

3.39 Discussions, assessments and education of patients or relatives with or by staff, therapists, social workers or relatives may be carried out in an interview/sitting room. These should be quiet and distraction-free to enable one-to-one communication. The same rooms may also be used by staff for staff interviews, appraisal and counselling.

3.40 The designer should aim to create an environment which is cheerful, comfortable and warm. Appropriate lighting and decorative textures such as pictures and plants can provide a tasteful domestic atmosphere. Finishes and furniture will have an important influence on the room. Easy chairs, a bookcase and coffee tables should be provided. It is important for rooms in which patients will be sitting to be free from draughts.

Informal social space

3.41 For patients – whether in single-bed rooms or multi-bed bays – open yet intimate areas recognisably intended for casual meeting and talking may be all that is required to enable patients who wish to socialise without the provision of dedicated day rooms. An American hospital uses window seats effectively for this purpose. One English hospital places two easy chairs and a small round table in a corridor alcove, in another a windowed corridor dead end is furnished in a similar way. It is not clear why designated day rooms in acute wards do not seem to provide the environment that people like to use. It may be the distance from the bed area and a sense of isolation; it may be that areas are insufficiently inviting or intimate by the use of "clinical" rather than hotel- or domestic-style furnishing, or by inadequate environmental control resulting in a space that is too hot, too cold, too stuffy, too smelly, too bright or too dimly lit. The experience of some hospitals has also been that an enclosed day room has been particularly vulnerable to vandalism.

Pantry/beverage making

3.42 The pantry should be equipped with facilities for:

a) the preparation of beverages and light snacks;

b) the filling of patients' water jugs;

c) storage of dry goods, and a limited amount of crockery and cutlery;

d) refrigeration of perishable food.

3.43 A mechanical dishwasher and separate facilities for washing-up and hand-washing are required. Crockery and cutlery used for main meals is returned to the central washing-up service.

Food trolley bay

3.44 If food will be served from the trolley onto plates this should be located within the pantry. If plated meals on trays are delivered ready for distribution the trolley bay may be located off a circulation space.

Resuscitation trolley bay

3.45 Emergency equipment, such as the resuscitation trolley, must be parked where it is accessible from the bedrooms, but should not obstruct circulation areas.

Storage

3.46 Store rooms are a costly means of providing storage as they require internal circulation space. Storage in relatively shallow cupboards or doored alcoves opening directly from circulation areas may be more convenient and cheaper. The latter is particularly useful for goods for which stocks are maintained by an exchange trolley service.

Clinical store/Controlled Drugs cupboard

3.47 A back-up lockable clinical store to the clinical supplies trolleys will be required. This store will be the secure storage necessary for controlled drugs, medicines and lotions. A fridge for clinical use may be required in this area.

3.48 A red indicating lamp should be provided on each Controlled Drugs cupboard and, where appropriate, outside the doorway to the room in which the cupboard is located and at a continuously staffed location. The lamps should be interlocked with the cupboard and alarm system to give visual and audible indication at the continuously staffed location of unauthorised entry to the cupboard.

3.49 An indicating lamp denoting that the circuit is energised should also be fitted to each cupboard. The supply circuits for the lamps and alarm system should be derived from essential circuits. BS 2881 provides information on cupboards and their installation.

Large equipment store

3.50 This store is required for bulky items of equipment, bed accessories and therapy aids. Open shelving, hanging rails and hooks as well as free standing space for heavy equipment such as hoists and weighing machines is required. Disposable items delivered in bulk packages to the clinical area will require storage.

Linen trolley bay

3.51 The type of linen store depends on the linen supply policy. This Note assumes an exchange trolley system which requires space to park linen trolleys. The volume of space is determined by the frequency of delivery.

Clinical supplies trolleys

3.52 Clean and sterile goods for daily use will be held on trolleys, at the point of use in the bedrooms under worktops.

Adminstration areas

Reception

3.53 The reception desk should be in a prominent position at the entrance. The counter needs to be stepped so that a person in a wheelchair can see and speak easily to the receptionist. The desk requires sufficient working space for a receptionist and one other who will welcome patients, relatives and staff, and undertake the local clerical and administrative duties.

3.54 The reception desk will be linked by computer to all areas. Space is required for a computer terminal and associated equipment. It should be wired as the centre for the patient to staff and a staff call system within the area. It should incorporate a facility for transferring a staff to staff emergency call to another manned point.

Office meeting room

3.55 This office is a multi-purpose office, but is likely to be used principally by clinical and therapy staff to complete notes on discharged patients, undertake telephone calls and for staff discussions. It should be sized to accommodate a desk with a computer terminal, a table and up to four people.

3.56 There is no separate sisters or medical staff office.

Stationery store/IT room

3.57 A general stationery store room, where a printer may be kept, is required. It should be shelved and well lit.

Day space/waiting area

3.58 A seated area should be provided near the reception desk for patients, relatives and ward visitors waiting to be received. The area may also serve as additional informal day space for patients.

Staff lockers

3.59 Staff often require local change facilities to leave outdoor clothes and lockers to hold small personal belongings easily accessible while on duty.

Utilities

Utility

3.60 The room serves as the temporary storage point and testing area for specimens. Bulky items such as bedpans with their carriers are stored here, as is equipment for the destruction of disposable bedpans or cleansing of non-disposable bedpans etc. Such equipment may generate significant noise levels and care should be taken to eliminate this. Colour-coded dispoal bags for the bagging of waste materials should be kept here.

Domestic services/cleaners room

3.61 The domestic services/cleaners room is the base from which domestic service staff provide the immediate day-to-day cleaning service. A clinical wash-hand basin should be provided. It should include storage for cleaning materials and equipment in daily use and facilities for the routine servicing and cleaning of equipment. The room should be well lit and ventilated; mechanical ventilation may be required. Bulky equipment has to be moved in and out of the room and this should be taken into account in its location.

Disposal hold/bay

3.62 The disposal room is the temporary storage point for all items of supplies and equipment which have to be removed for cleaning, reprocessing or destruction, eg linen and sterile services department items.

3.63 The waste disposal of used items should be consistent with the current hospital policy for the disposal of clinical waste.

Switchgear cupboard

3.64 A departmental switchcupboard housing the main isolators and distribution fuse switchgear should be:

a. accessible directly from the circulation area (access space may be part of the circulation area);

b. sited away from water services;

c. lockable.

3.65 Where possible the cupboard should be sited within the department. There should be clear and safe access for maintenance staff and care should be taken to ensure that safety is not compromised, during maintenance, from passing traffic or the opening of adjacent doors.

Essential complementary accommodation

Seminar room

3.66 It is assumed that a designated education centre with conference facilities for multi-disciplinary use will be available on site.

Staff rest room/beverage bay

3.67 Rest room facilities are required where staff can relax and take beverages. Rest rooms should have windows and a pleasant outlook and be comfortably furnished.

3.68 The rest room should include a beverage bay with facilities for preparing beverages for staff, for washing and storing crockery and cutlery, for storing a limited quantity of dry goods, and for the refrigerated storage of milk, etc.

3.69 Equipment should include a stainless steel sink and drainer, a refrigerator, an electric water boiler, and a worktop with cupboards.

4. Modules and schedules

Modules

4.1 The description of the activity spaces makes it evident that a range of different organisational arrangements may be encompassed.

4.2 The principle of devolved clinical care management to the patient bedside with services and supplies located as close as possible within a cluster is enabled by the modular approach.

4.3 Clusters may be aggregated to:

- provide a greater clinical grouping, flexed use, clinical overview and variable staffing cover over the 24-hour period;
- provide shared back-up services and facilities;
- enable facilities and bed management over a group of clusters for an economy of scale.

4.4 The content of different modules and the levels of aggregation attempt to balance the conflicting demands for a clinically suitable environment, a people-centred one and for efficient use of staff and capital resources. A bed module requires to be complemented by four supplementary modules.

4.5 There is a choice of two eight-bed cluster modules which enable beds to be provided in an arrangement of 50, 75 or 100% single-bed rooms.

Module 1 is an eight-bed cluster:

- eight single-bed rooms each with an ensuite facility and mini workstation;

Module 1a is an eight-bed cluster:

- four single-bed rooms each with an ensuite facility and mini workstation;
- four-bedded room with an associated en suite facility and mini workstation;
- an assisted (type 5) WC.

Complementary modules

Module 2 is the initial complementary module is for direct patient care activities and includes:

- one consultation/examination room;
- one interview/sitting room;
- one resuscitation trolley bay;
- one pantry and food trolley bay

Storage for goods and supplies in day-to-day use will be accommodated within the workstation – **backup storage is provided by Module 3**:

- linen trolley bay;
- clinical supplies trolley bay;
- clinical store/controlled drug cupboard;
- equipment store.

Module 4 is a utilities module including:

- utility room;
- disposal bay;
- cleaner's room;
- a standard (Type 1) WC;
- switch cupboard.

Module 5 provides the essential office and administrative facilities:

- reception desk;
- general office/meeting room;
- printer/IT/administration store room;
- waiting/social area;
- staff locker bay.

4.6 In addition, a staff rest room and a separate seminar room should be provided as essential complementary accommodation. Optional accommodation is an assisted bathroom (Type 2), a staff shower (Type 3) and – depending on the catering policy – a cook-chill regeneration room.

4.7 There is no designated office for medical or nursing staff, nor central staff base. The assumption has been made that direct clinical administration will be carried out at the point of activity, at the bedside or in the consultation/examination room using a terminal linked to a local area network. Pre-admission and post-discharge correspondence, private telephone calls and small clinical team meetings may take place in the office/meeting room. More general administration, bed management etc will be carried out at the reception desk.

4.8 There is no treatment or clean utility room. Patients likely to require treatments should be accommodated in single-bed rooms both for the containment of infection and for privacy. It is the assumption that clinical goods and materials for use will be delivered on a daily basis to the point of use with a small back-up store.

4.9 An independent eight-bed cluster is unlikely to be required except for specialist areas.

4.10 Modules may be aggregated in a variety of ways to suit local patterns of care delivery. Once more than three bed modules are associated together some but not all support modules are replicated. The table below identifies the aggregation of modules for different bed numbers from 16 to 56 beds.

Bed unit	% Single rooms	Module 1	Module 1a	Module 2	Module 3	Module 4	Module 5	Plus	Less	Total area m2
16 beds	50%	–	2	1	1	1	1			555
	75%	1	1	1	1	1	1			585
	100%	2	–	1	1	1	1			620
24 beds	50%	–	3	1	1	1	1			750
	80%	2	1	1	1	1	1			810
	100%	3	–	1	1	1	1			845
32 beds	50%	–	4	2	1	1	1			995
	75%	2	2	1	1	1	1			1005
	100%	4	–	1	1	1	1			1070
40 beds	50%	–	5	2	1	1	1			1190
	80%	3	2	2	1	1	1			1285
	100%	5	–	1	1	1	1	1 resus trolley bay		1300
48 beds	50%	–	6	2	2	1	1			1395
	75%	4	2	2	2	1	1			1525
	100%	6	–	1	2	1	1	1 resus trolley bay		1540
56 beds	50%	–	7	2	2	2	1	1 office meeting room	1 disposal	1635
	80%	4	3	2	2	2	1	1 office meeting room	1 disposal	1765
	100%	7	–	1	2	2	1	1 office meeting room	1 disposal	1805

Aggregations of modules from 16 to 56 beds

Essential complementary accommodation	Optional accommodation
Seminar room	Assisted bathroom
Staff rest room	Staff shower
	Cook/chill holding room

Table to show aggregation of bed and support modules and the associated area to provide facilities for up to 56 beds

Schedules of accommodation

Planning single-bed rooms

4.11 Several ways of configuring single-bed rooms are illustrated below using standard planning modules with room and circulation areas compared. Figures a–f are as follows:

a. A typical single-bed room including ensuite based on previous space standards will require between 18-22m^2. The example, with an internal ensuite, requires 21.8m^2.

b. By adding clinical support and family support space approximately 3m^2 will be added to the total bedroom area.

c. The inset position of the door to the single-bed room requires additional area to be provided within the room to access the ensuite.

d. Placing the ensuite as an external projection will save on overall room area but increases external wall area.

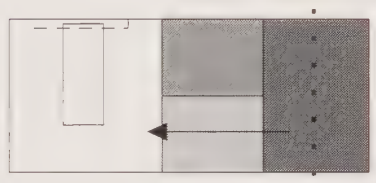
e. The fully integral ensuite will increase overall floor area and provide a deep alcove which could serve as a discrete family support area or day space.

f. Placing the ensuite between bedrooms is a more space efficient room layout but does increase overall the external wall area and the circulation space.

4.12 By analysing the examples below, a mean area allowance for bed spaces (including ensuites) in a single-bed room can be established at 24m^2. This value is used in generating the area modules in the schedules of accommodation.

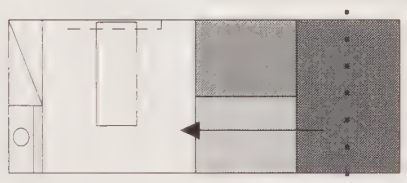
Planning single rooms

a



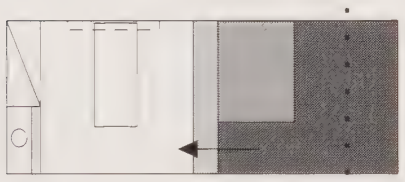
3 ZONE	• Internal ensuite	21.8 m^2
	• No support	+ 5.24 m^2
	• Access in bedroom	@24.0 % circ
	Total	**27.04 m^2**

b



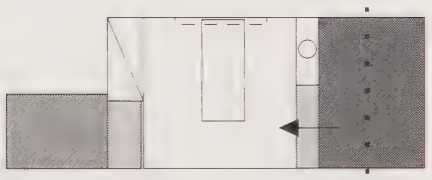
5 ZONE	• Internal ensuite	24.26 m^2
	• Support	+ 5.24 m^2
	• Access in bedroom	@22.0 % circ
	Total	**29.5 m^2**

c



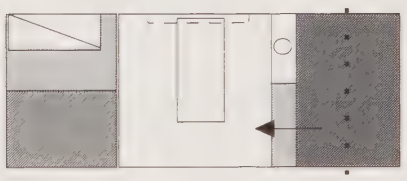
5 ZONE	• Internal ensuite	22.5 m^2
	• Support	+ 7.0 m^2
	• No access in bedroom	@31 % circ
	Total	**29.5 m^2**

d



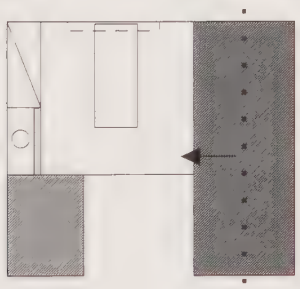
5 ZONE	• External ensuite (projecting)	22.4 m^2
	• Split support	+ 5.24 m^2
	• Access in bedroom	23.0 % circ
	Total	**27.64 m^2**

e



5 ZONE	• Adjacent ensuite	21.5 m^2
	• Support	+6.0 m^2
	• No access in bedroom	@ 27%
	Total	**27.50 m^2**

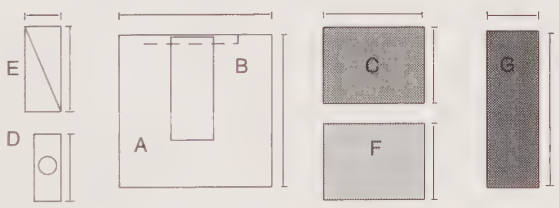
f



5 ZONE	• External ensuite (integral)	24.0 m^2
	• Split support	+ 5.24 m^2
	• Access in bedroom	@22.0 % circ
	Total	**29.24 m^2**

Planning allowance

A+B =	13.5m^2
C =	4.5m^2
D+E =	3.0m^2
	20.5m^2
F =	3.5m^2
	24.0m^2
G =	4.5m^2
TOTAL	28.5m^2



4.13 Details of the activity spaces contained in each module follow.

Schedules of Accommodation - 8 Bed Cluster

Activity Spaces	Space Area m2	Module 1 100% Singles No	Module 1 100% Singles Area
Bed and Sanitary Facilities			
Single Room	13.5	8	108.0
En-suite assisted shower/wc/whb	4.5	8	36.0
Family and clinical support	3.0	8	24.0
	Sub-Total		**168.0**
	Planning	5%	8.4
	Sub-Total		**176.4**
	Engineering	3%	5.3
	Circulation	25%	44.1
		Total	**225.8**
		Departmental Total	**225**
		Area/bed	**28.1**

Activity Spaces	Space Area m2	Module 1A 50% Singles No	Module 1A 50% Singles Area
Bed and Sanitary Facilities			
Single Room	13.5	4	54.0
En-suite assisted shower/wc/whb	4.5	6	27.0
Family and clinical support	3.0	5	15.0
Multi-bed (4 bays)	48.0	1	48.0
	Sub-Total		**144.0**
	Planning	5%	7.2
	Sub-Total		**151.2**
	Engineering	3%	4.5
	Circulation	25%	37.8
		Total	**193.5**
		Departmental Total	**195**
		Area/bed	**24.4**

Patient Support Facilities - Module 2

	Space	Module 2	
Activity Spaces	**m2**	**No**	**Area**
Consultation/examination room	16.5	1	16.5
Interview/Sitting Room	9.0	1	9.0
Resuscitation Trolley Bay - 1 trolley	2.0	1	2.0
Pantry/Beverage making	12.0	1	12.0
Food Trolley Bay	1.5	1	1.5

Sub-Total		**41.0**
Planning	5%	2.1
Sub-Total		**43.1**
Engineering	3%	1.3
Circulation	25%	10.8
	Total	**55.1**

Backup Storage - Module 3

	Space	Module 3	
Activity Spaces	**m2**	**No**	**Area**
Linen Trolley Bay	1.5	1	1.5
Clinical Supplies Trolley	1.5	1	1.5
Clinical store/controlled drug cupboard	1.5	1	1.5
Store - Equipment - large	10.0	0.5	5.0

Sub-Total		**9.5**
Planning	5%	0.5
Sub-Total		**10.0**
Engineering	3%	0.3
Circulation	25%	2.5
	Total	**12.8**

Utilities - Module 4

	Space	Module 4	
Activity Spaces	**m2**	**No**	**Area**
Dirty Utility - small	6.5	1	6.5
Disposal hold/bay - large	8.0	1	8.0
Cleaners Room	7.0	1	7.0
WC/whb - type1	2.0	1	2.0
Switchgear Cupboard	1.0	1	1.0

Sub-Total		**24.5**
Planning	5%	1.2
Sub-Total		**25.7**
Engineering	3%	0.8
Circulation	25%	6.4
	Total	**32.9**

Office and Administrative Services - Module 5

	Space	Module 5	
Activity Spaces	m2	No	Area
Reception - 2 position- open	10.0	1	10.0
Office - 1 position + meeting area	16.0	1	16.0
Printer/IT/administration store room	6.0	1	6.0
Waiting Area - 5-10 persons	16.0	1	16.0
Staff locker bay	1.5	1	1.5

Sub-Total		**49.5**
Planning	5%	2.5
Sub-Total		**52.0**
Engineering	3%	1.6
Circulation	25%	13.0
	Total	**66.5**

Essential Complementary Accommodation

	Space	Planning	Sub-Total	Engineering	Circulation	Total
Activity Spaces	m2	5%		3%	25%	
Staff Rest Room/Beverage Bay - 20 pers	20.0	1.00	21.0	0.6	5.3	**27.0**
Staff Rest Room/Beverage Bay - 10 pers	16.0	0.80	16.8	0.5	4.2	**21.5**
Seminar Room - 10 persons	20.0	1.00	21.0	0.6	5.3	**27.0**
Seminar Room - 20 persons	30.0	1.50	31.5	0.9	7.9	**40.5**
Seminar Room - 25 persons	45.0	2.25	47.3	1.4	11.8	**60.5**

Optional Accommodation and Services

	Space	Planning	Sub-Total	Engineering	Circulation	Total
Activity Spaces	m2	5%		3%	25%	
Assisted bathroom/wc/whb - Type 2	16.0	0.80	16.8	0.5	4.2	**21.5**
Staff Shower/whb - Type 3	6.5	0.33	6.8	0.2	1.7	**8.5**
Disposal hold/bay - large	8.0	0.40	8.4	0.3	2.1	**11.0**
Cookchill/Hot Trolley Holding Room	26.0	1.30	27.3	0.8	6.8	**35.0**
Resuscitation Trolley Bay - 1 trolley	2.0	0.10	2.1	0.1	0.5	**2.5**
Office meeting room	16.0	0.80	16.8	0.5	4.2	**21.5**

5. Engineering and mechanical services

5.1 An acute hospital requires a most complex range of engineering services. These services contribute about one third of the total capital outlay and are a significant feature of an operational budget. Most of these services are required within the in-patient area. Attempts have been made in the recent past to be selective in the distribution and outlets for services in the in-patient areas in the interest of economy. This has proved a false economy – flexibility in bed utilisation is lost and the increased acuity of patient illnesses requires all bed spaces to have the full range of services.

5.2 Engineering and mechanical services have been constantly researched, studied and the findings promulgated through an extensive range of guidance – notably the Health Technical Memoranda series. This provides the specialist advice which covers the areas beyond those met in normal building and design practice. The following paragraphs summarise the relevant guidance for in-patient areas. Sources are listed at the end of this section.

Activity Data

5.3 Environmental and engineering technical data and equipment details are described in Activity Data Sheets. They provide a source of reference for space, temperature, lighting levels, outlets for power, telephones, and other equipment.

Safety

5.4 The Health and Safety at Work etc Act 1974, partly amended by the Consumer Protection Act 1987, together with the Workplace Regulations and the Work Equipment Regulations, (Northern Ireland equivalents are the Health and Safety at Work (Northern Ireland) Order 1978 and the Consumer Protection (Northern Ireland) Order 1987) imposes statutory duties on employers and designers to minimise risks arising from the use, cleaning or maintenance of engineering systems. One of the requirements of the legislation is to ensure, so far as is reasonably practicable, that the design and construction of equipment ensures it is safe and without risks to health at all times when being set, used, cleaned or maintained by a person at work.

Fire safety

5.5 The project team should familiarise themselves with FIRECODE (Northern Ireland equivalent is Northern Ireland Firecode: Policy and Principles), which contains the Department's policy and technical guidance on fire safety in hospitals and other NHS premises. In addition, the Fire Practice Note series provides guidance on specialist aspects of fire precautions. In Scotland, refer to 'Firecode in Scotland'.

Noise

5.6 Excessive noise and vibration from engineering services, whether generated internally or externally and transmitted to individual areas (or noise from other sources, for example, speech which can be transmitted by a ventilation system), can adversely affect the operational efficiency of the department and cause discomfort to patients and staff.

Space for plant and services

5.7 Space for plant and services should provide:

- easy and safe means of access, protected as far as possible from unauthorised entry;
- for frequent inspection and maintenance. Sufficient access panels should be provided for this purpose;
- for eventual removal and replacement of plant.

5.8 The distribution of mechanical and electrical services to final points of use should, wherever possible, be concealed in walls and above ceilings. Heat emitters should be contained within a 200mm-wide perimeter zone under window sills and critical dimensions should be taken from the boundary of this zone.

5.9 The 200mm zone includes the floor area occupied by minor vertical engineering ducts and is included in the building circulation allowance.

5.10 Services contained in the space above the false ceiling, with the exception of drainage, should be confined to those required for the department.

Access to control and isolation devices

5.11 Devices for the control and safe isolation of engineering services should be:

- located in circulation rather than working areas;
- protected against unauthorised operation;
- clearly visible and accessible, where intended for

operation by the department's staff.

Engineering commissioning

5.12 The engineering services should be commissioned in accordance with the validation and verification methods indentified in the latest HTMs. Flow measurement and proportional balancing of air and water systems require adequate test facilities to be incorporated at the design stage.

Mechanical services

Heating

5.13 In spaces heated by low pressure hot water systems radiators of a low surface temperature type should be used. Surface temperatures should not exceed 43°C. Exposed hot water pipework accessible to touch should be insulated.

5.14 Radiators should normally be located under windows or against exposed walls with sufficient clear space between the top of the radiator and the window sill to prevent curtains reducing the output. *There should be adequate space underneath to allow cleaning machinery to be used*. Where a radiator is located on an external wall, back insulation should be provided to reduce the rate of heat transmission through the building fabric.

5.15 It is recommended that all radiators should be fitted with thermostatic radiator valves. These should be of robust construction and selected to match the temperature and pressure characteristics of the heating system. The thermostatic head incoporating a tamper-proof facility for presetting the maximum room temperature, should be controlled via a sensor located integrally or remotely as appropriate. To provide frost protection at its minimum setting, the valve should not remain closed below a fixed temperature.

5.16 Radiators may also be used to offset building fabric heat loss in mechanically ventilated spaces.

5.17 Flow temperatures to heating appliances should be controlled by the BMS in accordance with space requirements and external temperatures. The system should be zoned to suit the building.

Ventilation (general)

5.18 Air movement induced by mechanical ventilation should be from clean to dirty areas, where these can be defined. The design should allow for an adequate flow of air into any space having only mechanical extract ventilation, through transfer grilles in doors or walls. The introduction of untempered air should be avoided and should not prejudice fire safety or privacy.

5.19 Mechanical ventilation should ensure that both supply and extract systems are in balance, and take account of infiltration.

5.20 Fresh air should be introduced via a low velocity system and should be tempered and filtered before being distributed via high level outlets. Diffusers and grilles should be located to achieve uniform air distribution within the space, without causing discomfort to patients.

5.21 A separate extract system will be required for "dirty" areas, for example, lavatories. It should operate continuously throughout the day and night. A dual motor fan unit with an automatic changeover facility should be provided.

Hot and cold water services

5.22 All cold water pipework, valves and fittings should be economically insulated and vapour sealed to protect against frost, surface condensation and heat gain.

5.23 The domestic hot water supply should be taken from the general hospital calorifier installation at a minimum outflow temperature of 60°C ± 2.5°C and distributed to all outlets such that the return temperature at the calorifier is not less than 50°C.

5.24 The requirements for the control of legionellae bacteria in hot and cold water systems must be observed.

Electrical services

Electrical installation

5.25 The point of entry for the electrical supply should be a switch cupboard housing the main isolators and distribution equipment. This space will also be the distribution centre for subsidiary electrical services. Supplies should be metered and, whenever possible, equipment should be mounted at a height which gives easy access from a standing position. Switchgear should be lockable in the "off" position.

5.26 The electrical installation in occupied areas should be concealed using PVC insulated cables in galvanised screwed steel conduit with waterproof fittings.

Emergency electrical supply

5.27 Guidance on emergency electrical supplies is contained in HTM 2011 – 'Emergency electrical supplies'.

Electrical interference

5.28 Care should be taken to avoid mains-bore interference, electrical radio frequency and telephone interference affecting physiological monitoring equipment, computers and other electronic equipment used here or elsewhere on the site.

5.29 Electical products, systems and installations should not cause, or be unduly affected by, electromagnetic interference.

5.30 Fluorescent luminaires should comply with BS 5394.

Lighting

5.31 Colour finishes and lighting throughout the department should be co-ordinated to create a calm and welcoming atmosphere.

5.32 Architects and engineers should collaborate to ensure that decorative finishes are compatible with the colour rendering properties of the lamp and that the spectral distribution of light sources is not adversely affected.

5.33 Luminaires should be manufactured and tested in accordance with the requirements specified in the relevant sections of BS 4533. Their location should afford ready access for lamp changing and maintenance, but with the overriding requirement that the recommended standard of illuminance is provided to the task area *in all rooms* illuminations should be fixed and of a quality which will enable suturing to be undertaken.

5.34 The number and location of luminaires connected to a circuit and the number of switches and circuits provided should allow flexibility in the general and local level of illumination, particularly in areas away from windows where daylight can vary significantly. Areas which may be unoccupied for long periods may be suited to automatic/presence switching.

5.35 Generally, energy efficient luminaires should be used wherever possible. Intermittently and infrequently used luminaires may be fitted with compact fluorescent or incandescent lamps.

5.36 Where visual display terminals (VDT)s are to be used, the lighting should be designed to avoid bright reflections on the screen and to ensure that the contents of the screen are legible.

Socket-outlets and power connections

5.37 Sufficient 13 amp switched and shuttered socket-outlets, connected to ring or spur circuits, should be provided to supply all portable appliances likely to be used simultaneously. The installation of twin outlets should be considered where activities occur in juxtaposition.

5.38 Switched socket outlets should be provided in corridors and in individual rooms to enable domestic cleaning appliances with flexible leads (9 metres long) to operate over the whole department.

5.39 Appliances requiring a three-phase supply, or those rated in excess of 13 amp single phase, should be permanently connected to separately protected sub-circuits. The sub-circuits should be fed from the distribution board and terminate at a local isolator. Fixed appliances, less than 13 amp rating, should be permanently connected to a double-pole switched 13 amp spur outlet. The spur outlet should contain an indicating light, where appropriate, and a suitable fuse.

5.40 Isolation switches should be provided adjacent to all engineering plant and equipment for use by maintenance staff.

5.41 Heating appliances and automatic equipment should have indicator lights to show when they are energised. Such indicators should be contained in the control panel of the apparatus, in the control switch or in the socket-outlet from which the apparatus derives its supply.

5.42 The socket-outlets within an area should be connected such that a supply is available from at least two separately fused circuits of the same phase.

Personal alarm transmitters

5.43 If personal alarm transmitters are to be used by staff, conduits and accommodation for transmitting/receiving equipment and propagating devices, such as induction loops and/or aerials, will be required to suit the selected system.

Security alarm

5.44 A security alarm actuating switch or button is required at the reception desk. It should be connected to a continuously staffed area in the hospital.

Staff location system

5.45 The hospital staff location system should cover all in-patient areas.

Patient/staff and staff/staff call systems

5.46 The patient/staff and staff/staff call systems may be hard-wired or radio systems. In all cases they must be electromagnetically compatible.

5.47 Patient/staff call points should be provided wherever a patient may be left alone. Each call unit should comprise a push button or pull cord, reassurance lamp and reset unit. The audible alarm signal initiated by patients should operate for one second at ten second intervals with corresponding lamps lit continuously until cancelled.

5.48 Staff/staff call points should be provided wherever staff consult, examine and treat patients. Call units should generally comprise a switch (pull to call, push to reset) and reassurance lamp. The audible alarm signal initiated by the staff should operate intermittently at half second intervals with corresponding lamps flashing on and off at the same rate.

5.49 A visual and audible indication of a call should be provided at the reception desk to give responding staff unambiguous identification of the origin of the call.

Telephones

5.50 Central telephone facilities for internal and external calls will normally be available and should be extended to serve this department. Telephones will normally be of a desk or wall-mounted pattern.

5.51 Coin- and/or card-operated payphones – which may be fixed or mobile – depending on local policy, should be provided to enable patients or visitors to make phone calls in private.

5.52 Self-contained intercommunication systems are relatively inflexible and limited in the extent of their economic application. Any subsequent modifications to them usually involve disproportionate cost. Only in very rare instances can such systems be justified for functional or clinical reasons. Consequently, reasons for providing a separate intercommunication system should be clearly shown. Option appraisals should be undertaken in considering the systems to be selected.

5.53 A properly planned telephone system will provide prompt intercommunication facilities between all extensions. Abbreviated dialling can be used for a range of frequentlycalled extension numbers.

Patient communications systems

5.54 Patients (including those with visual and auditory handicaps) may need to be kept informed of waiting times and/or called for treatments, etc. Options include announcements:

- by a member of staff personally;
- over a loudspeaker system;
- using VDTs.

Data links

5.55 Conduits and/or trunking will be required for cables to interconnect electronic equipment. The extent to which these conduits and/or trunking should link all workstations in this department and the main hospital system or elsewhere will depend on the local policy for automatic data processing. If a structured cable system is to be installed within the hospital, then the department should be provided with all outlets wired and connected. Conduits and/or trunking may also be required to link closed-circuit television between the seminar room and treatment areas.

Clocks

5.56 Clocks may be of impulse, synchronous or battery/quartz type.

Internal drainage

General

5.57 The primary objective is to provide an internal drainage system which:

- uses the minimum of pipework;
- remains water- and air-tight at joints and connectors; and
- is sufficiently ventilated to retain the integrity of water seals.

Design parameters

5.58 The design should comply with the relevant British Standards and Codes of Practice, including BS 5572, and the current building regulations. Recommendations for spatial and access requirements for public health engineering services are contained in HSE Data Sheet EA5.

5.59 The gradient of branch drains should be uniform and adequate to convey the maximum discharge to the stack without blockage. Practical considerations, such as available angles of bends, junctions and their assembly, as well as space considerations, usually limit the minimum gradient to about 1:50 (20 mm/m). For larger pipes, for example 100mm diameter, the gradient may be less, but

this will require workmanship of a high standard if an adequate self-cleaning flow is to be maintained. It is not envisaged that pipes larger than 100mm diameter will be required within interfloor or ground floor systems serving this department.

5.60 Provision for inspection, rodding and maintenance should ensure "full bore" access and be located to minimise disruption or possible contamination. Manholes should not be located within this department.

6. The business case

6.1 The business case for building or refurbishing in-patient accommodation hinges, as do all business cases, on the demonstration of a financial return on the investment as well as a qualitative improvement in the facility.

6.2 This return may be generated from an increased effectiveness of in-patient care, an increased efficiency by which in-patient care is delivered and/or by an increase in volume of business that may be achieved.

6.3 Measuring effectiveness and efficiency of in-patient care is difficult with the number of variable factors that operate. Proxy measures for effectiveness of care include length of stay, hospital aquired infection rate, and untoward patient incident. Efficiency measures include the turnover interval, the bed utilisation rate and staff utilisation.

6.4 The volume of business may be measured by activity, indicated by the number of finished consultant episodes or the number of admissions/discharges. It may also be measured by the value of the activity and may be used when considering changing from a low to high value type of activity or vice versa.

6.5 In developing a business case for investment in in-patient accommodation the objective must be a lower unit cost of activity whether the expectation is to maintain or is to increase the present level of activity, as the investment itself through the capital charge increases the overall cost of the in-patient service.

Design and cost

6.6 Design that is efficient, ie has:

- a regular shape;
- a low wall-to-floor ratio;
- a limited number of floors;
- short communication routes;
- short service distribution routes;
- concentrated services;

is one factor in a robust business case.

6.7 The philosophy of this Note is based on the location of activity associated with in-patient care at the bedside, with a high proportion of single-bed room accommodation in small clusters. This provides the opportunity for closer staff to patient contact, shorter travel time, and the flexibility in the use of accommodation.

6.8 Locating activities at the bedside and in single-bed rooms has the implication of requiring relatively large bed spaces. The business case will depend in part on the extent to which the spaces for bedside activities are not replicated elsewhere, eg rehabilitation, visitors' overnight accommodation, storage rooms; in part on the extent to which shorter travel and circulation routes minimise clinical staff travel time; and in part on the high utilisation opportunities of single-bed rooms and small multi-bed rooms.

6.9 The guidance in this Note gives design standards for space, services and the environment to allow a comprehensive range of activities associated with in-patient care to be undertaken. (The principal exclusion is intensive care.) However it is for the project team to judge the extent to which the full range will be undertaken and thus the standard of provision required. Compromises on design standards should be explicit. They should be made in the understanding of:

- their implications for activity, and
- the consequent effect on the business case.

6.10 Research carried out in 1976 indicated that occupancy and lengths of stay were dramatically improved by the introduction of single-bed rooms. Occupancy grew from 75 to 90% and average length of stay reduced from 10.2 to 7.4 days. It is accepted that these levels are now being achieved in many instances. However if present day levels could be improved to a similar degree, this would have a significant impact on the overall bed requirement.

6.11 In aggregating bed clusters and support modules different configurations have different efficiencies. Rectilinear layouts:

- are spatially efficient and easy to build;
- have long straight corridors and therefore long travel distances.

Triangular layouts:

- are compact and flexible;
- may be combined with rectlinear to form a zig zag.

Centric layouts are:

- efficient for 14- to 16-bed units;

- efficient in their use of space;
- difficult and expensive to build.

6.12 The issues for consideration in designing the bed space in single-bed rooms and multi-bed bays to accommodate activities, and in the design of an operational unit are fully discussed in chapter 9.

Construction cost

6.13 Costs are also influenced by the specification of the materials and finishes required. A balance needs to be struck between the use of materials which have a lower initial cost, but require more frequent repair and replacement – and those which are initially more expensive, but over time are more economic with less frequent repair or replacement.

6.14 Conversely, the use of long-life materials may be unnecessary in areas which house rapidly developing/changing services or technology and which are likely to be upgraded, altered or modified frequently.

6.15 Internal partitions and finishes are also of significance. Demountable partitions are an attractive proposition in low-serviced areas where change is envisaged in the short term. They are less useful in areas where noise transmission, fire safety and robustness are important.

6.16 A greater range of floor coverings and wall finishes is now considered acceptable. Here again, life cycle costing is particularly important. A planned maintenance and replacement programme is required to ensure an environment retains a pleasing appearance. Whilst finishes should be adequate for the wear and tear of the expected level of activity, there may be an acceptance of a trade-off between the use of a higher cost, longer-life finish and one which allows for more frequent updating of a decor.

Refurbishment of existing buildings

6.17 Project options for in-patient accommodation are likely to include the modification or refurbishment of existing buildings as well as newly-built facilities.

6.18 As an approximate indicator for use at early cost planning stages, a recent independent research study by the Building Cost Information Service (BCIS), based on a sample of 75 projects, showed average refurbishment costs for hospitals as 68% of new-build.

6.19 However, in considering the economic limit in respect of in-patient accommodation, the business case will need to reflect wider issues. The most critical being the capacity of the site for new-build, and the functional relationships with other essential complementary or support services.

6.20 Before a decision is made to upgrade existing stock for in-patient accommodation, the long-term strategy for the Trust's health services and estates must be considered. Additional considerations have to be made in the cases of:

- the expected life of the existing structure and technical services;
- the structural constraints which would be imposed on the functionality of the proposed facility;
- the relationship of the proposed facility to complementary and supporting facilities;
- planning restrictions;
- the logistics involved in maintaining services during a refurbishment programme.

6.21 In assessing the costs for business case purposes the balance between capital and revenue is also likely to differ:

- building cost may be low;
- revenue costs may carry an **"inefficiency penalty"** where:

  – mechanical and engineering services of an outdated design are retained to be consistent with the established services;

  – the building envelope conditions an inappropriate organisation of space;

  – etc.

6.22 As many trusts will be considering refurbishment of existing facilities the following chapter reviews some examples of hospital stock found in the UK today. Case studies of refurbishment in chapter 8 are examined to explore the potential of old stock, the difficulties met and the compromises made.

7. Hospital wards in the UK

7.1 This chapter describes some of the hospital accommodation which has developed over the last 100 years and is still in use today. Existing stock provides the starting point for upgrading and refurbishment to modern standards.

7.2 UK public hospital design may be considered to date from the 1860s following Miss Nightingale's treatise 'Notes on Hospitals' (1863) and the building of her exemplar – St. Thomas's Hospital on the south bank of the River Thames. However, in the UK there exist several hospitals founded before that date which retain, at the least, facades from the eighteenth century.

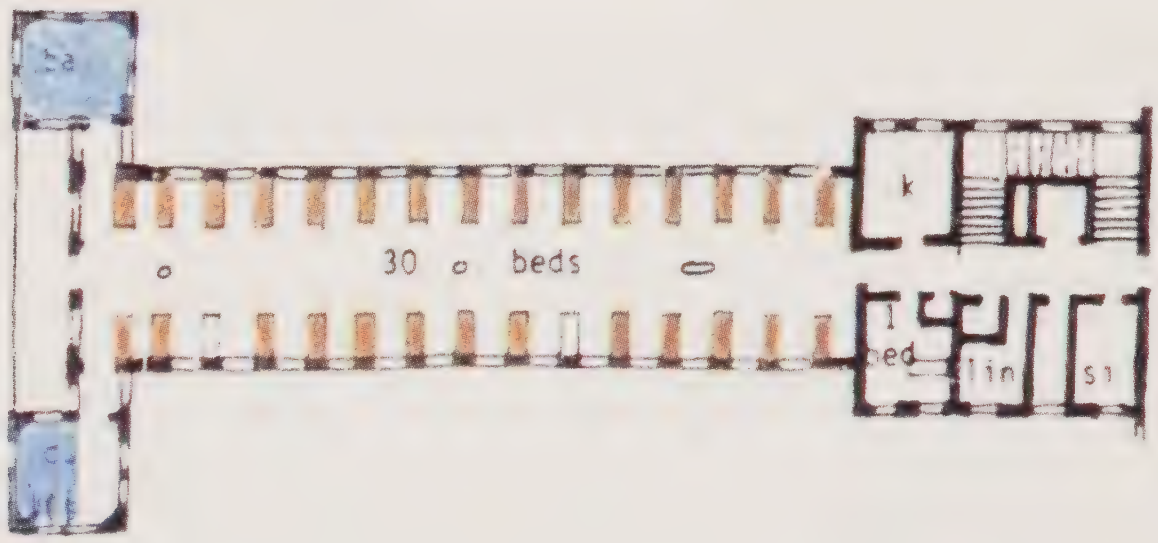
7.3 The hospitals which Miss Nightingale studied and analysed before developing her own proposals were mostly religious foundations in Europe caring for the sick poor. The care of well-to-do medical patients was usually undertaken in the relative safety of home.

7.4 Surgery before the discovery and development of anaesthetic agents was limited.

7.5 It is important to recall this background. It has conditioned both the evolving ward design and the organisation of the delivery of care, despite the dramatic changes in clinical technology over the last one hundred and fifty years, and the organisational changes in employment practices, particularly in respect of women since the Second World War.

7.6 The following seven plans illustrate the most common ward designs to be found in use in the UK today. A brief commentary accompanies the plans.

Long-nave "Nightingale" ward

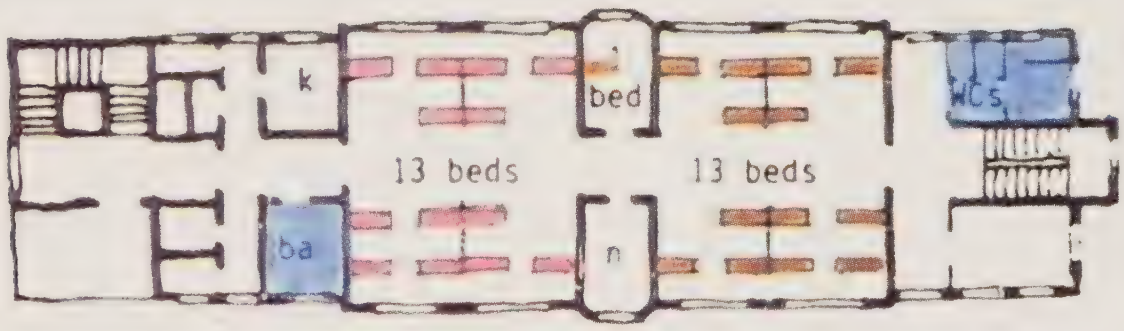


The ward developed during the latter half of the last century. It had an open bed space for approximately 30 beds with sanitary areas, store rooms and services at either end. There was generally one single-bed room. Men and women were cared for in separate wards. Patients were largely confined to bed, although convalescent patients were expected to wash themselves and to undertake "light household duties". Care was essentially medical and nursing care at the bedside, delivered by a single clinical team. The supervision of nursing care, housekeeping and the administration of the ward was undertaken by the ward sister.

7.7 The next significant milestone in the development of in-patient accommodation was the study of the Nuffield Working Party in 1955. It was commissioned by the Department of Health following the establishment of the National Health Service when the need for a national hospital development programme had become evident. The study was comprehensive, examining all the factors influencing ward design. It is a source of data that is still relevant in many respects.

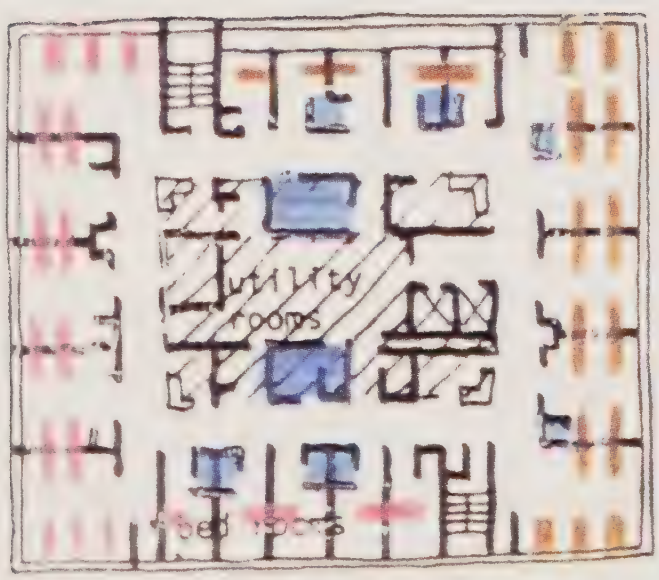
7.8 The authors of the final report observed that "in planning accommodation for in-patients, the problem is to reconcile maximum economy in provision with the proper conditions for medical care and adequate amenity for the patient... including sufficient privacy".

Early 20th Century "sub-divided" wards



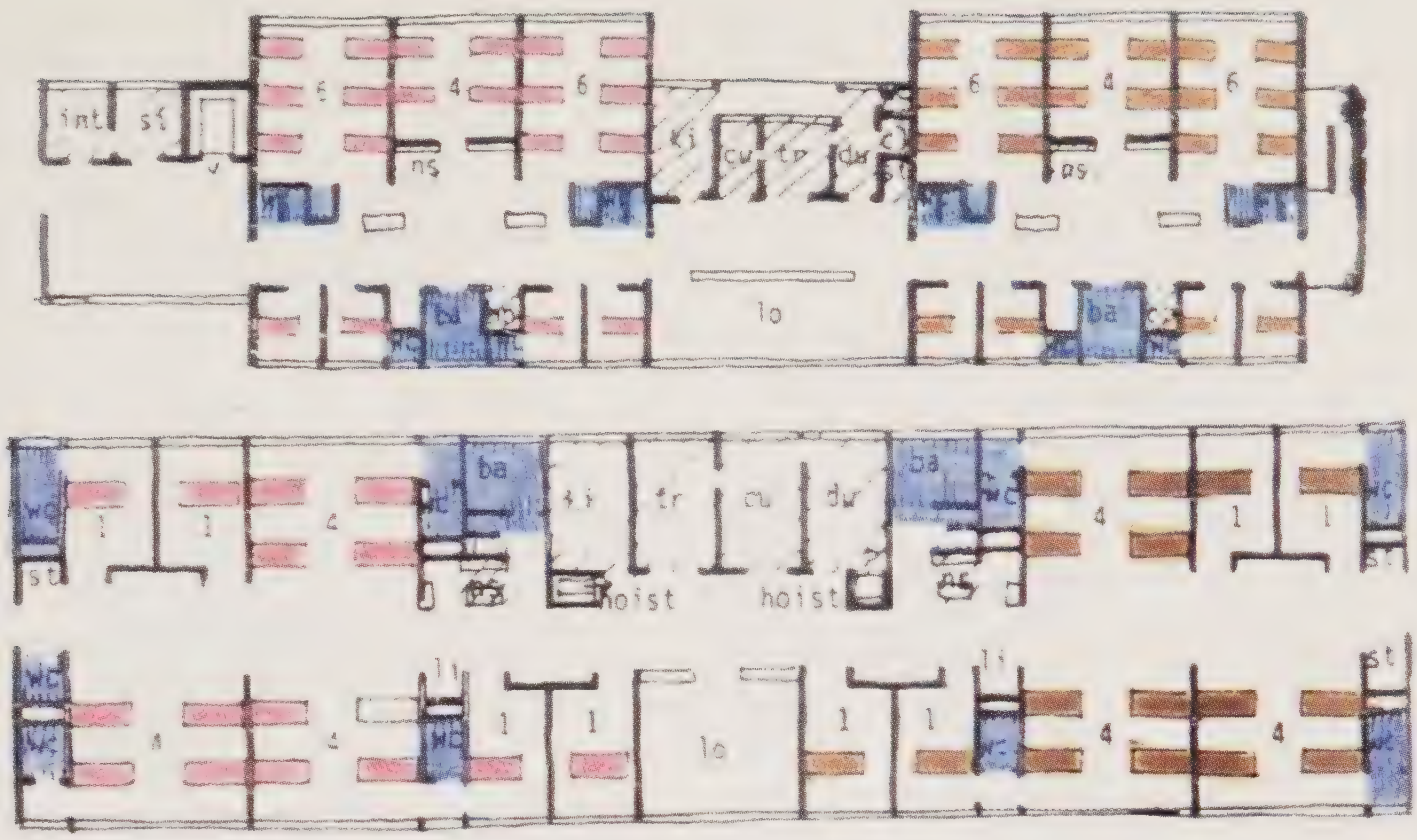
Improvements in living standards led to a modification of the above design, with smaller bed areas to give a degree of privacy. The nursing station and a single-bed room effectively split the ward into two wings, allowing men and women to be cared for in separate wings. There has been little change in the overall management and clinical supervision in this model. In 1890, a witness to a Select Committee of the House of Lords said that a nurse could safely care for six patients at a time.

Post war "racetrack"



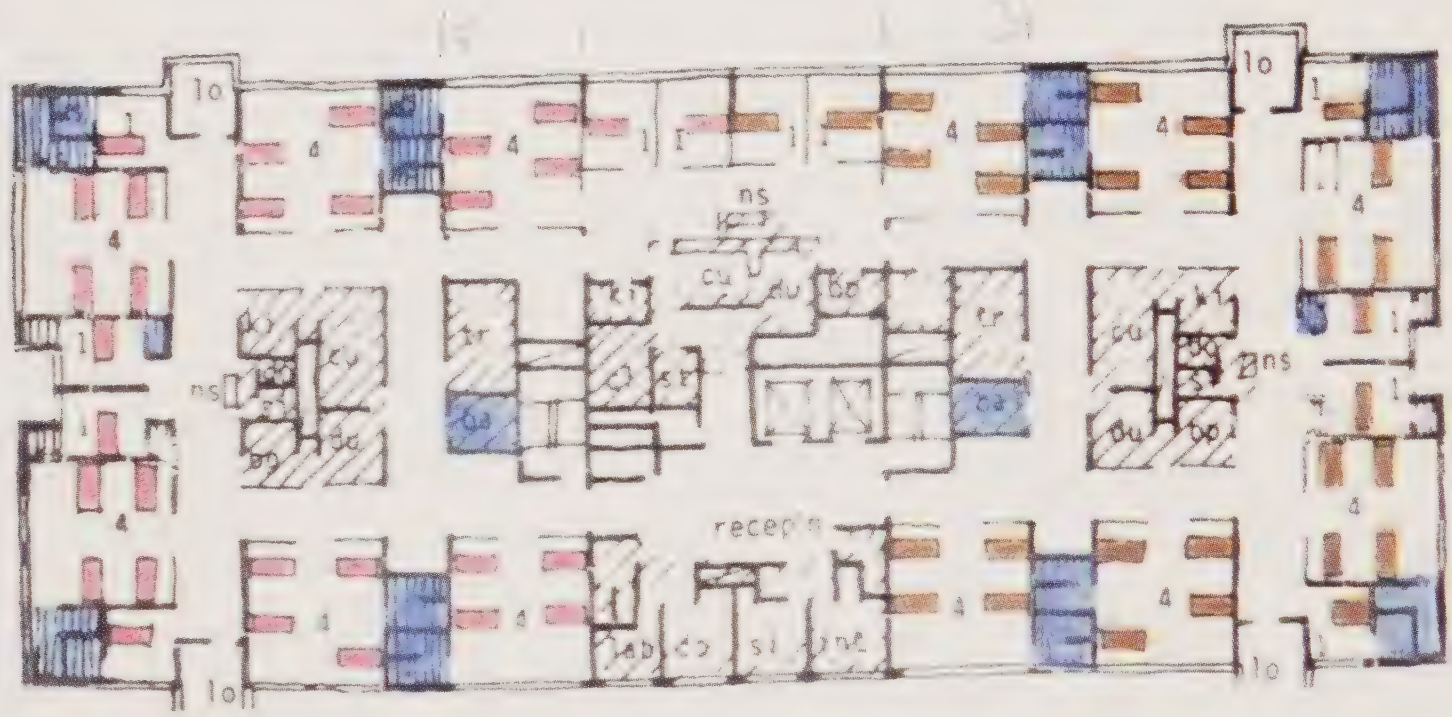
*In the 1950s and 60s, provision of hospital buildings on small urban sites led to the development of tall hospital buildings with perimeter wards grouped around central cores of utilities and circulation, with provision of 16 to 60 beds (or exceptionally more) in various mixes of patient dependency categories. This ward layout provided a mixed-sex ward with multi-bed bays for use either by female or male patients, and became known as '**racetrack**'.*

1950s "Nuffield" wards



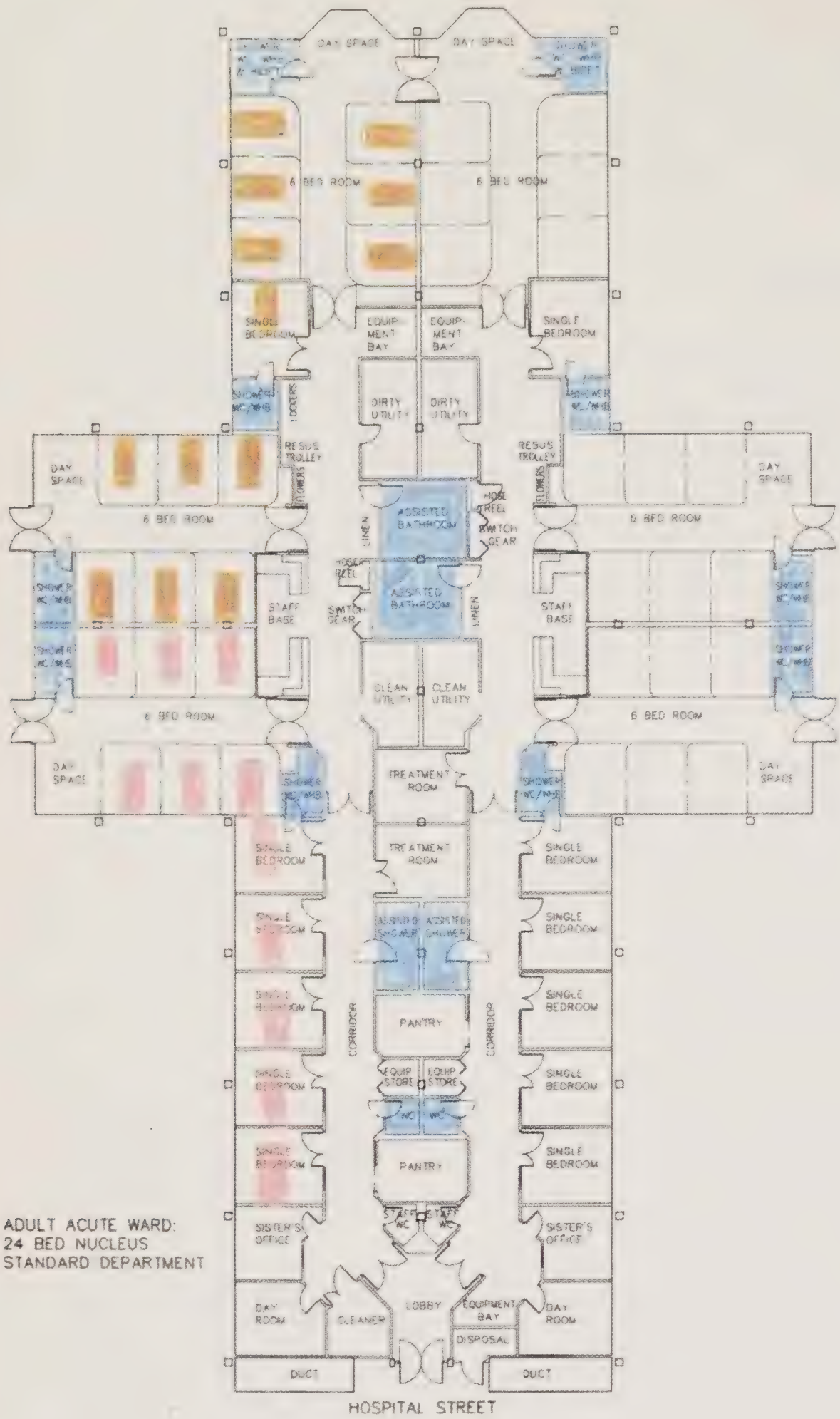
In effect the designs that resulted from the Nuffield Working Party study turned the early ward inside out. Multi-bed bays and more single-bed rooms were separated by a central core of support facilities. The single nursing team largely remained, but on a day-to-day basis the team was split to cover separate areas of the ward. By this time patients of several consultants might be accommodated in one ward. Sometimes the wings were used to accommodate the patients of different consultants, or patients of different sex.

1960s "Falkirk" ward



The Falkirk ward was a variation on the racetrack concept. It had a strong central core of facilities with dispersed work stations from which nurses could manage a number of bed bays and/or single-bed rooms flexibly in accordance with variations of workload. The higher space standards were justified by greater amenity for patients and convenience for staff. Four-bedded bays were preferred to six-bedded bays. Internal glazed partitions assisted observation.

"Nucleus" wards c1980-1990 – a pair of 24-bed wards

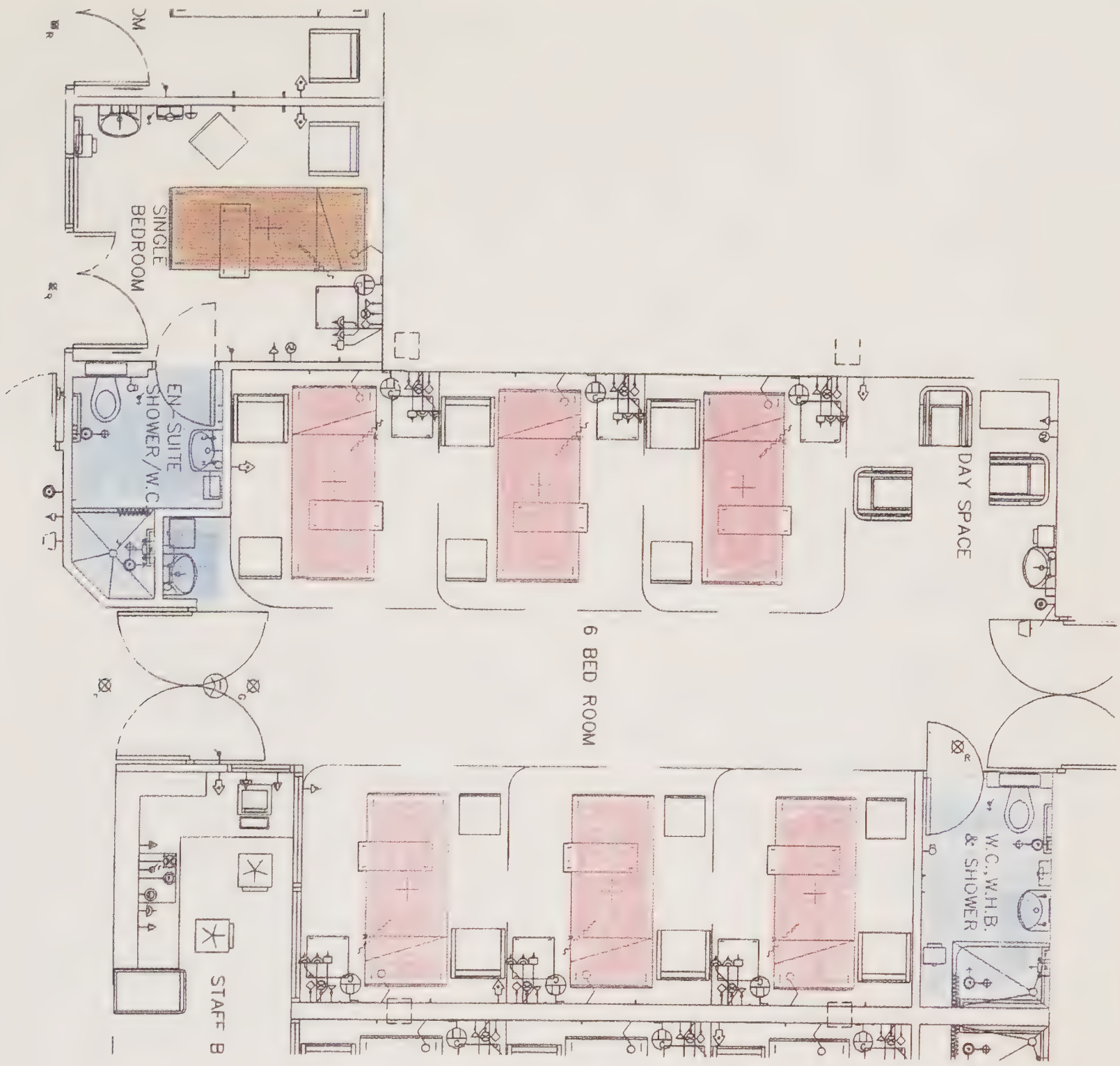


The Nucleus ward had six single-bed rooms and three multi-bed rooms of six beds. This allowed for the team nursing of a small group of beds – although all support facilities were centrally located.

7.9 Following the oil crisis of the mid-1970s and the recognition of the energy demands of "deep planned" buildings, the Estates and Building Division of the Department of Health developed a modular design concept. This concept was based on principles that aimed to control energy consumption by maximising the external wall area available for windows, limiting the number of floors and standardising the services. It also incorporated principles of fire safety by compartmentalisation of areas for the containment of fire and the lateral evacuation of personnel between compartments.

7.10 Different designs on these principles were developed – such as "Best Buy" and "Harness". The ultimate design using these principles became known as "Nucleus" with a standard template of a cruciform of 1,000m^2. Two wards in mirror image fitted into a single template.

"Nucleus" wards 1990 – a six-bed room and a single-bed room



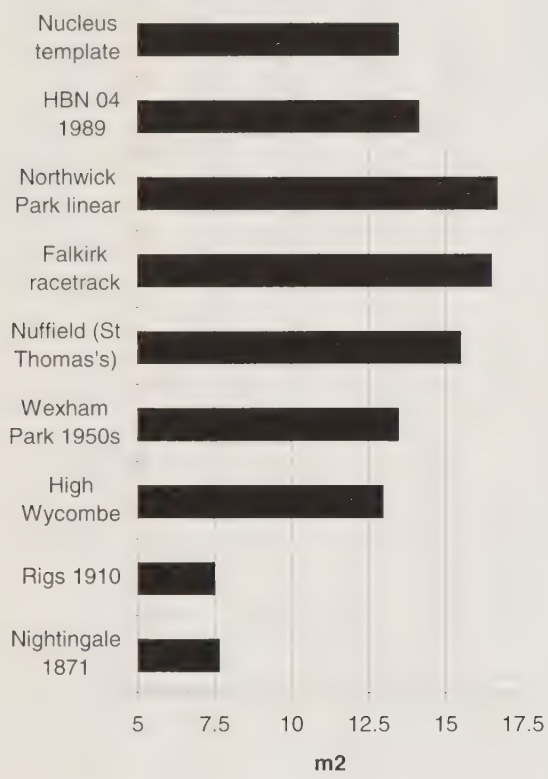
7.11 Although the Nucleus template could be customised, hospitals have largely used the model variations suggested in Health Building Notes between 1985 and 1990. However it should be noted that hospital planning at this time was not limited to Nucleus.

7.12 Private hospitals in the UK have tended to use all single-bed room accommodation for patients, working to the principle that hospital care is a substitute for care at home.

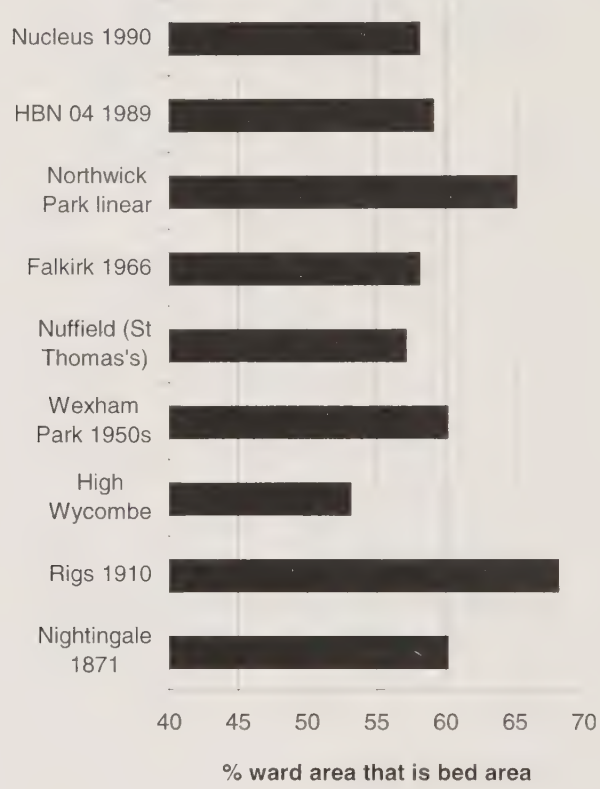
COMPARATIVE WARD STUDY Influence of form on Area	Nightingale Ward - St Thomas' 1871	Rigs Hospital Copenhagen 1910	High Wycombe Hospital 1950s	Wexham Park 1950s	Nuffield (St Thomas') 1966	Falkirk Royal Infirmary UK 1966 Experimental Ward	Northwick Park Hospital	HBN 4 1989	Nucleus Template 1990
Type	Nightingale	Bed-bay	Racetrack	Bi-nuclear	Nuffield	Racetrack	Linear	Schedule	Racetrack
Size of nursing unit	1 x 31	1 x 26	2 x 20	2 x 16	1 x 28	2x24+1x12	1 x 30	1 x 24	2 x 24
Total number of beds	31	26	40	32	28	60	30	24	48
Single beds	1 (3.2%)	0 (0%)	8 (20%)	8 (25%)	12 (20%)	12 (20%)	6 (20%)	6 (25%)	8 (16.6%)
Space area per bed	7.58	7.44	12.90	13.41	15.43	16.33	16.26	14.08	13.42
Support area per bed	1.74	1.38	7.00	4.06	7.04	5.75	5.08	4.46	5.13
Circulation per bed	3.35	2.17	4.00	4.75	4.71	6.00	3.83	5.42	4.38
Total area per bed	12.68	10.99	23.90	22.22	27.18	28.08	25.53	23.96	22.92

Table to show floor areas and distribution of wards designed between 1870 and 1990

Graph to show immediate bed space area in selected wards designed between 1870 and 1990



Graph to show total bed space area as a percentage of total floor area in selected wards designed between 1870 and 1990



7.13 The analysis of the floor areas of the spaces of the different designs is given in the table and graphs above.

7.14 The layout of the 1871 Nightingale ward had the advantage of good observation. However, Rig's Hospital, Copenhagen, built in 1910 (the forerunner to the four-bedded bay) offered poorer observation but was more efficient in terms of floor area. Since then, area per bed space has almost doubled. A mean area per bed of 14m^2 for multi-bed wards (with 25% of the beds in single rooms) was considered adequate when HBN 04 (1990) was published.

7.15 The most recent guidance issued by NHS Estates for HBN 04 (1990) and Nucleus Data Pack (1990) settled on approximately 23m^2 gross area per bed.

7.16 Since the 1950s the provision of space in wards has remained fairly constant, averaging about 25m^2 gross area per bed. The considerable range of floor areas – from 33.6m^2 at St. Thomas' Hospital, London, to 18.62m^2 at St. Mary's Hospital, London – is accounted for by the range in the provision of support space rather than to their racetrack layouts.

7.17 There is no apparent relationship between the changes in the immediate bedspace area and the changes in nursing activity and clinical practice.

7.18 The area per bed space as a proportion of the whole has remained fairly constant at a mean of approximately 60% of the total floor area. For multi-bed wards circulation rarely exceeds 25% of the total area, with 15% for support facilities.

8. Case studies

Introduction

8.1 The aim of including case studies is to illustrate real physical constraints and design solutions applied to recent projects in the UK. The section is not an evaluation but a commentary on issues raised elsewhere in the document. Of the five examples, three were in use at the time of writing and it will be some time before evaluation can take place. The commentary is restricted to a broad description of the proposals and a desktop analysis of layout and floor area.

The selection of case studies

8.2 The case studies which are included in the Note represent the most recently completed projects to upgrade in-patient facilities in accommodation typical of many hospitals in the UK. They represent the different starting points from which Trusts have initiated change; some have been driven by new developments in philosophy of care and service delivery, and for some the focus has been primarily on improving the quality of the physical environment. The following issues are covered in some or all of the examples:

- **the Patient's Charter and people-centred care:**

  – preserving patient privacy and dignity including segregation of existing mixed-sex wards and improving washing and toilet facilities;

  – improving the environment to facilitate better communication and information exchange between patients and staff;

- **health gain:**

  – projected changes in patient acuity and dependency;

  – the reorganisation of clinical staffing care;

  – increased capacity.

8.3 The age, layout and size of the examples are diverse, ranging from early 20th century Nightingale wards to a recently completed rooftop extension to a multi-storey ward block. A Nucleus exemplar is included to illustrate the potential for its conversion to single-bed room accommodation.

8.4 The specific attributes of each example are described together with an analysis of floor area.

Floor area analysis

8.5 Floor areas of the case study wards and comparative ward study areas were measured from architects' drawings at a scale of 1:200 or 1:250. Accurate measurement of internal walls or vertical ducts were made only if adequate detail was indicated within the source material. In the absence of such detail an allowance was assumed. Net floor areas are areas within external walls, but excluding stairs, lifts, large ducts and main communication corridors.

8.6 Measured rooms were split into areas per bed for each of three categories; bed areas included toilets and day space, support areas included assisted bathrooms, utilities and all staff areas; circulation space included internal partitions and ducts.

8.7 Areas per bed are approximate and are only intended to illustrate the relative spaciousness of the staffing units listed. Some inconsistencies may occur in the types of shared or supporting accommodation included in the net ward areas.

CASE STUDY 1

POOLE HOSPITAL NHS TRUST

8.8

PROJECT INFORMATION

Region:	South West Region
Client:	Poole Hospital NHS Trust
Consultants:	Llewellyn Davies
Project:	Reconfiguration of existing in-patient accommodation for patient-focused care

Background

8.9 In planning a major redevelopment programme to re-provide accommodation for a number of specialties, Poole Hospital NHS Trust undertook a review of its hospital ward designs and philosophy of care for in-patients. Key nursing and medical staff visited other healthcare sites, including selected hospitals in the USA – some of which were affiliated to the Planetree Organisation. In the view of the Trust the philosophy embodied in Planetree was transferable to their own setting. (The Planetree Organisation aims to "personalise, humanise and demystify" hospital care without compromise to clinical safety. The movement is based on the belief that treating people as people and not just their illnesses is of vital importance.)

8.10 In developing a new philosophy of care the Trust carried out an extensive consultation process with patients and staff and the results were incorporated into a set of values which underpin the "Poole Approach":

- to provide effective care and treatment, with knowledge, skill, competence and initiative.
- to give full and relevant information and education that is easily understood and accessible.
- to respect freedom and allow choice.
- to be sensitive to people's right to privacy and confidentiality.
- to acknowledge and act on different preferences, beliefs, cultures and disabilities.
- to create a welcoming and supportive environment that allows family and friends to participate in care.
- to treat each other with respect and consideration.
- to examine what we do and keep trying to improve it.
- to accept responsibility for our own actions.

8.11 The Trust has already implemented 30 pilot projects, many of which centre on how staff interact with patients and carers. Other projects have involved the specific redesign of the hospital to support the desire for a more private, dignified and less stressful experience.

8.12 The hospital recently embarked on a redevelopment and refurbishment programme which included the re-modelling of a six-storey block with medical, surgical and training services. The aim was to design the buildings as a user-friendly environment to reflect the way that Poole wishes to care for and treat patients in the future. The environment would be open, light and airy; provide for peace, privacy, and conversation; include reading rooms, kitchens for patients and relatives to cook their own meals and domestic-scale dining areas.

8.13 Improvement of Paediatric facilities was targeted initially with the aim of providing in-patient, out-patient and day case care in one unit which would be specifically designed to meet child and family needs.

8.14 Features of the new adult accommodation include:

1. Single-bed rooms with ensuite facilities

- cushion bench settee with integral storage which converts to a bed for overnight stay;
- single wardrobes each containing lockable cupboards and compartments for valuables and drugs (self-administration);
- desk unit;
- bookshelves;
- recliner chairs allowing a second carer or relative to stay overnight;
- sliding picture frames which conceal medical gas outlets when not in use;
- domestic lighting.

2. Staff alcoves

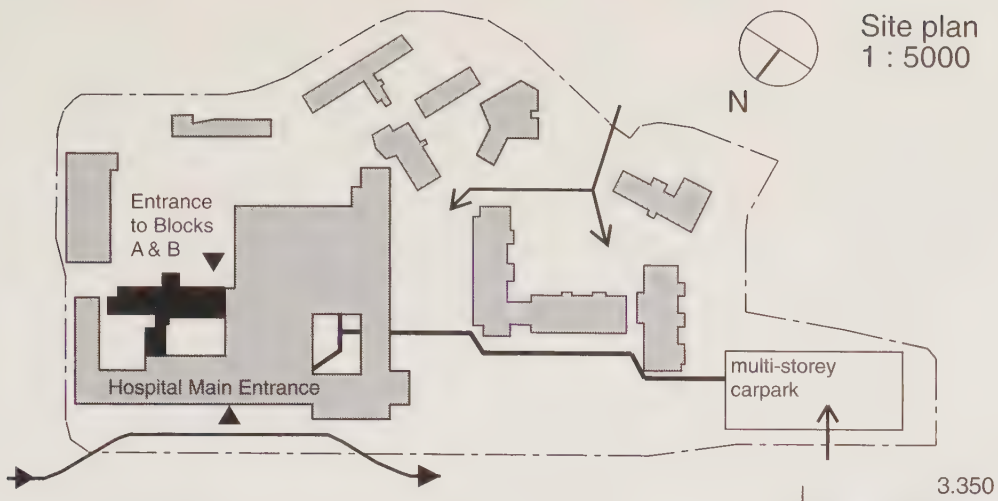
Strategically placed workstations for each staffing team which cares for a group or cluster of about 6-8 patients. Central staffing stations are still retained.

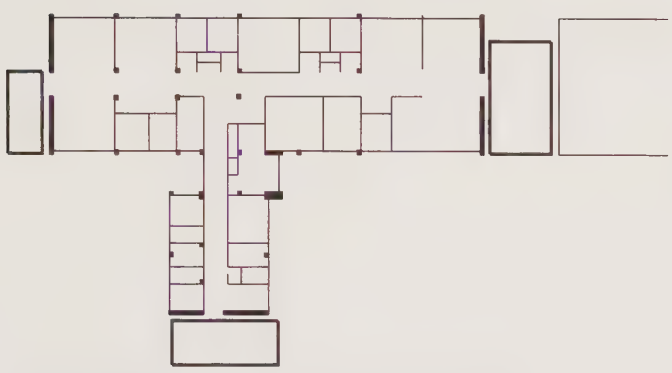
3. Day spaces

Following adverse criticism of the existing large day rooms, smaller and more discrete day spaces have been provided within each patient cluster.

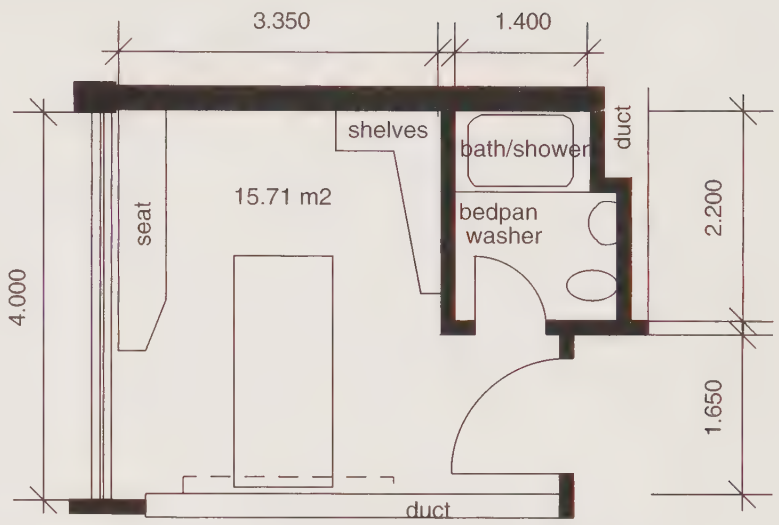
4. Kitchens

The policy allows access to these facilities for patients and their carers.

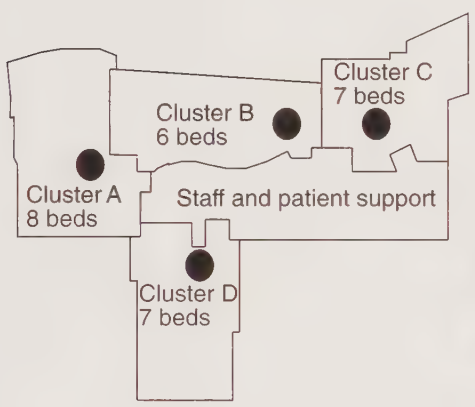


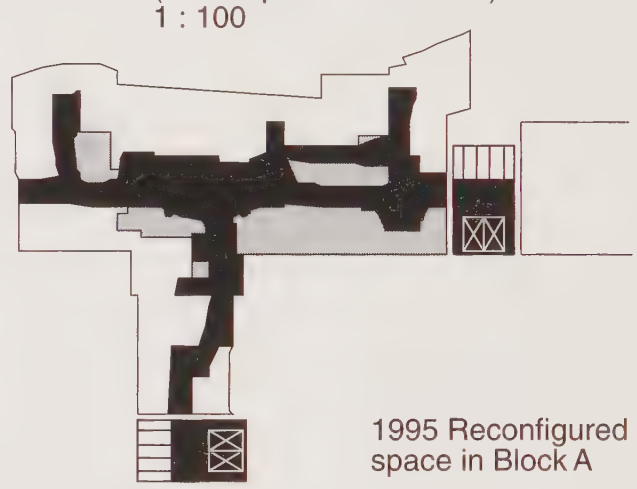


Original layout of 30 bed unit in Block A

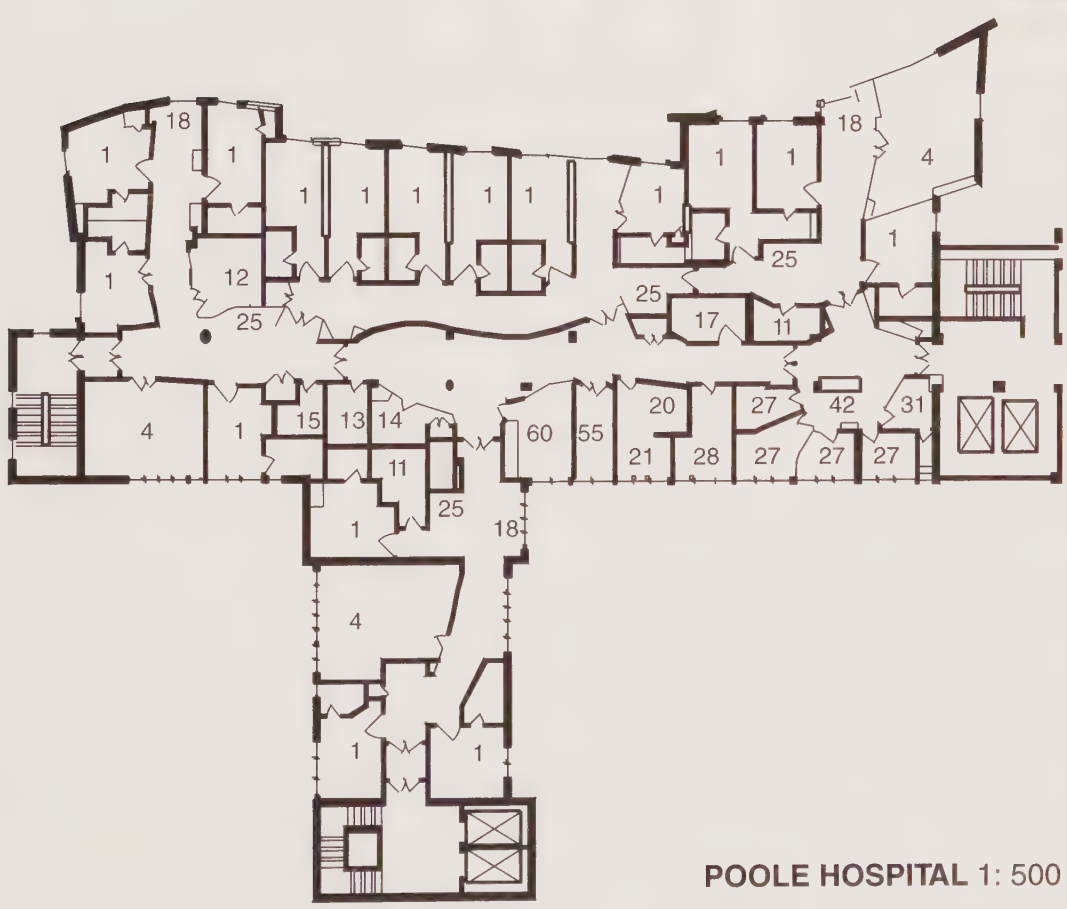


Typical single bedroom with ensuite
(as completed in Block B) 15.71 m²
1 : 100





1995 Reconfigured
space in Block A



POOLE HOSPITAL 1: 500

1 Single room with ensuite
11 Assisted shower
12 Assisted bathroom
13 Clean utility
14 Dirty utility
15 Cleaner
17 Treatment
18 Dayroom
20 Kitchen
21 Dining
25 Nurse workstation
27 Office
28 Interview
30 Store
31 Staff rest room
42 Reception/Unit office
55 Main equipment store
60 Switchgear/Plant

Design

8.15 The standard patient unit has 28 beds, divided into four patient sub-units – the optimum number cared for by a qualified nurse and an assistant. These units are intended to be the patients' home for the duration of their stay and comprise three or four single-bed rooms, one four-bed room and a sitting area, all separated from the main corridor. Each sub-unit is served by a staffing base – a small alcove fitted with work bench, computer and storage for routine dressings. The four sub-units are served by three groups of centralised facilities: patient care, patient social and staff support facilities.

8.16 The initial intention was to place all patients in single-bed rooms. However, a patient survey commissioned by the Trust showed that patients like to have the option of four-bed rooms because some feel isolated in single-bed rooms. The Trust consequently opted to give patients the choice.

8.17 Patient care facilities include a conventional treatment room, a preparation area, a disposal room and an assisted bathroom. The social facilities include kitchen/dining room and interview/private room where patients and visitors can meet in a more domestic environment.

8.18 The staff support facilities are separate from the patient environment and include staff WCs and shower, rest area, office, reception and storage bay. The reception/clerical base is designed as an open bay with circular table for consultation and discussion. It is also a resource base, containing medical records, communication facilities and reference material.

8.19 The aim of the Trust was to create a homely, non-threatening environment. Every effort has been made to make these rooms as non-clinical as possible. They are decorated in warm materials including hardwood strip flooring which is elegant and reflects light effectively. Medical gases, headsets and plugs are concealed behind sliding panels decorated with artwork. This approach to interior design is adopted throughout the unit. All public areas are carpeted. The curved walls are intended to increase the sense of space in corridors and to soften the appearance of the unit by removing angularity.

8.20 Poole is one of 58 hospitals which participated in a survey of hospital in-patient experiences carried out by St. Mary's Hospital Medical School and Social and Community Planning Research (SCPR). The views were incorporated into the design brief on which the architects based their proposals.

8.21 Poole commissioned a further survey by SCPR to:

- determine patients' reactions to their recent hospital experience in relation to environment, facilities, privacy, information and involvement of carers;
- explore suggestions for improving the hospital;
- assess reactions to specific proposals for the new ward developments.

8.22 Contrary to staff expectations, most patients said they preferred small ward-based accommodation rather than single-bed rooms. However patients accepted the cluster ward design, a kitchen on each ward and a variety of small rooms rather one large day room, a ward notice board with a nominated person to contact for information and a divan bed for overnight stay.

Form and layout

8.23 The new in-patient accommodation is located in a six-storey, rectangular ward block – an asymmetrical T-shape. This has been extensively remodelled (both internally and externally) to express different elements of the plan. Specific architectural treatments highlight each function.

8.24 Three of the clusters are arranged on the south side, which is most extensively remodelled (and has expansive views over Poole harbour). The fourth cluster is located at the rear of the block with views to the east and north.

Floor area allocation

8.25 The re-configuration of the physical layout of traditional wards of multi-bed bays into single-bed room clusters makes Poole the most radical of the case studies included in this Note.

8.26 Overall total floor area per bed has increased by 50%, although the proportion of space for bed areas has decreased due to the high rate of circulation needed to fulfil the concept of clustering. Circulation has risen from $5m^2$ to $15m^2$ per bed – possibly a high price to pay for the conversion to single-bed rooms. The location of ensuite bathrooms and the preferred bed location (fixed by the installation of in-situ bedhead services) constrains the usable space within all the bedrooms, particularly the four-bed rooms which do not have ensuite shower and WC facilities. Space for support areas before and after remodelling has remained constant, at 4.8 m^2 per bed.

Comment

8.27 The combination of a determined client with a "visionary" service philosophy and a perfectionist design team has produced a solution that is both resourceful and enjoyable, despite the constraints of an existing ward block of unpromising proportions. Compromises have had to be made in the use of space – particularly in the shared rooms; but the overall impression is that the brief has been more than adequately fulfilled.

The Planetree principles of care

8.28 Planetree takes its name from the plane tree under which Hippocrates, the founder of modern medicine, taught his pupils 2,400 years ago. The principles of the Planetree Organisation are as follows:

1. The experience of illness has the potential for being a time of personal growth for the patient. It can be used to re-evaluate life goals and values, clarify priorities and discover inner resources.
2. Patients have many facets; physical, emotional, intellectual, spiritual and aesthetic, and they are not isolated units, but members of families, communities and cultures.
3. Patients are individuals with rights, responsibilities and choices regarding their own health and lifestyles.
4. Patients have the right to access information about all aspects of their health, illness and hospitalisation.
5. Patients have the right to open and honest communication in a warm, caring environment.
6. All people – patients, their families and the professional staff – play a unique and vital role in the health care team.
7. A nurturing environment – one that is supportive, friendly and caring – is an essential component of providing quality health care.
8. The physical environment is vital to the healing process and should be designed to promote healing and learning, as well as patient and family participation.

CASE STUDY 2

KINGSTON HOSPITAL NHS TRUST

8.29

PROJECT INFORMATION

Region:	South Thames Region
Client:	Kingston Hospital NHS Trust
Consultants:	Llewellyn Davies
Project:	Reconfiguration of existing in-patient accommodation for patient-focused care

Background

8.30 In 1991 Kingston Hospital (one of the first hospitals to be given trust status) undertook a comprehensive review of the hospital's services, which identified a number of in-patient issues to be addressed:

- services were suffering from delays due to lack of co-ordination, inefficient scheduling and poor results reporting;
- the service was fragmented and de-personalised: the average patient met in excess of 45 staff across a range of disciplines during a typical five-day stay;
- centralisation resulted in excessive bureaucracy – diverting time, effort and resources away from patient care;
- there was no clear focus for accountability of care as each professional could advise only on his/her own sphere of work;
- care was provided by the least trained staff and those in training;
- service provision was remote from top management.

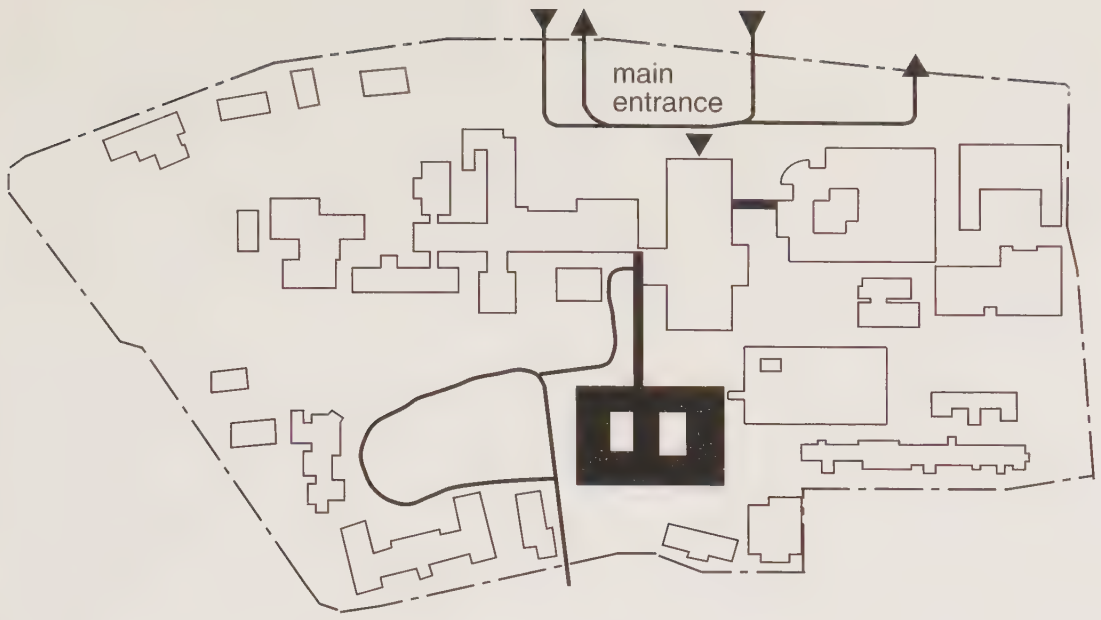
The Trust decided to completely rethink the organisation of its services, with the intention of creating a patient-focused unit in which the culture would be one of sharing the workload, with an emphasis on meeting patient needs.

8.31 The first patient-focused area (which went "live" in October 1993) was the Medical Unit. The second phase, a new Maternity Unit, was opened in April 1995. Each unit was given the responsibility for planning and implementing the change.

8.32 The Medical Unit was used as a pilot site to assess and refine the approach including the communications policy and the new working arrangements. Through a rigorous analysis of the way care was delivered, opportunities for change were identified as:

- putting services closer to the bedside;
- the multi-skilling of staff;
- development of care teams;
- operating unit autonomy;
- development of multi-disciplinary case notes.

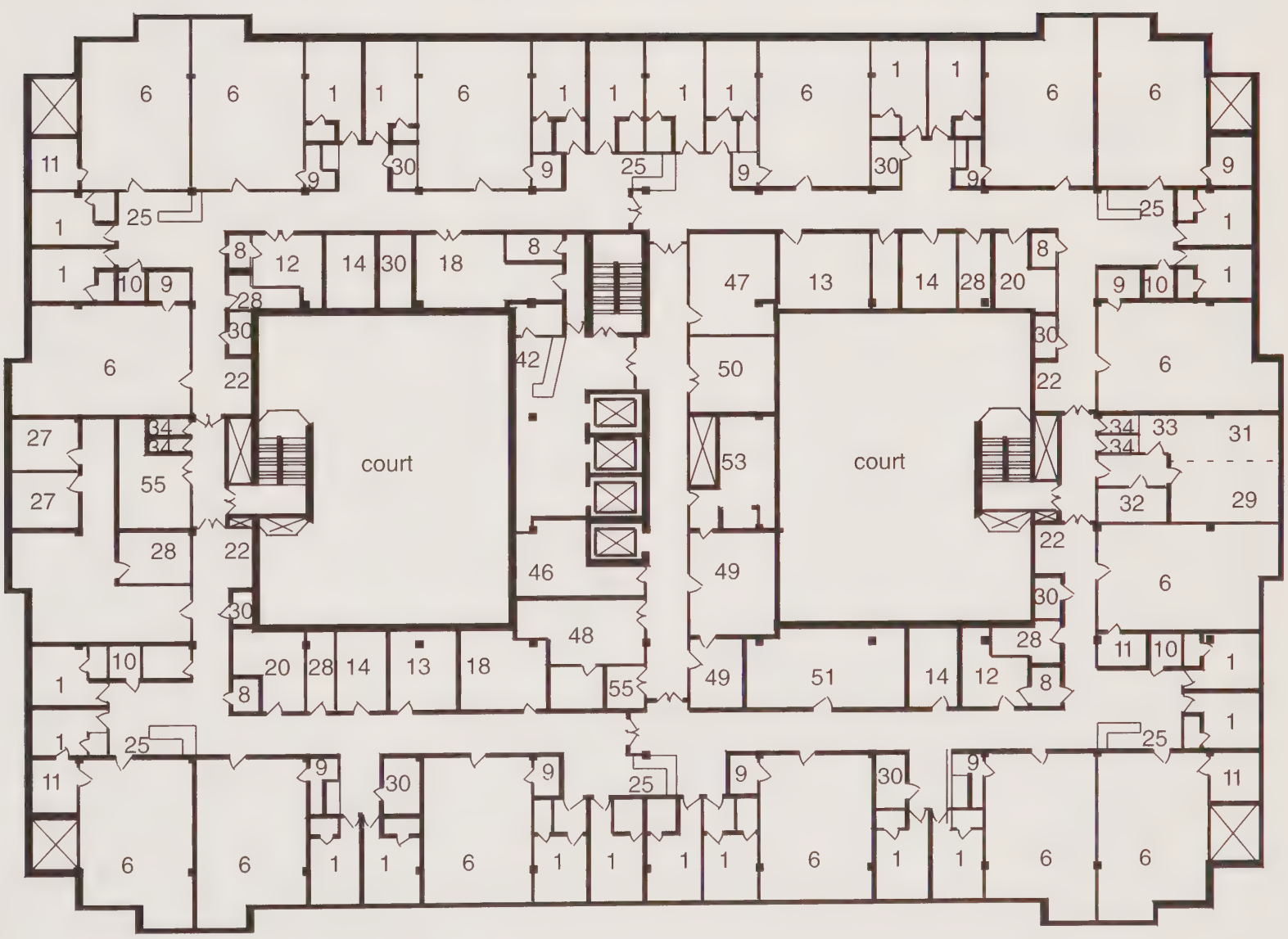
8.33 Project teams were established for both phases for the duration of the implementation period to co-ordinate communications, provide support to staff and deliver training. A substantial commitment to training led to the establishment of a separate training facility providing a wide range of programmes including care skills, blood taking, management development, housekeeping and computer skills. Patient-focused care on the Medical Unit required capital investment of over £1.2M to re-design facilities for the provision of local services such as X-ray, pharmacy and pathology.



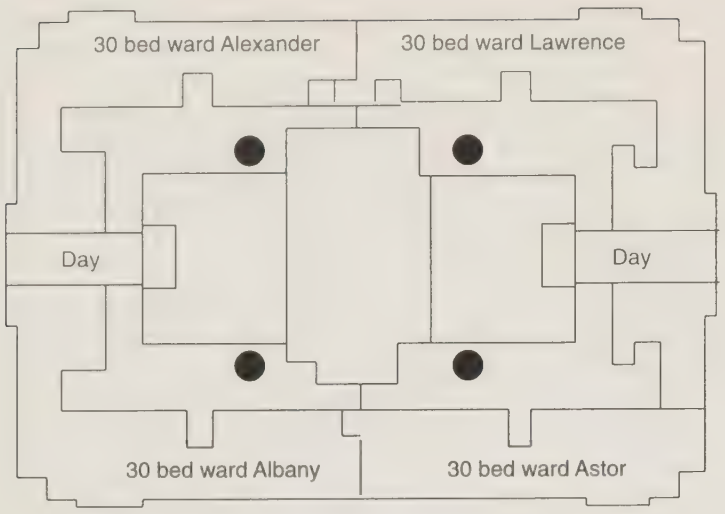
N

KINGSTON HOSPITAL
Site plan
1 : 5000

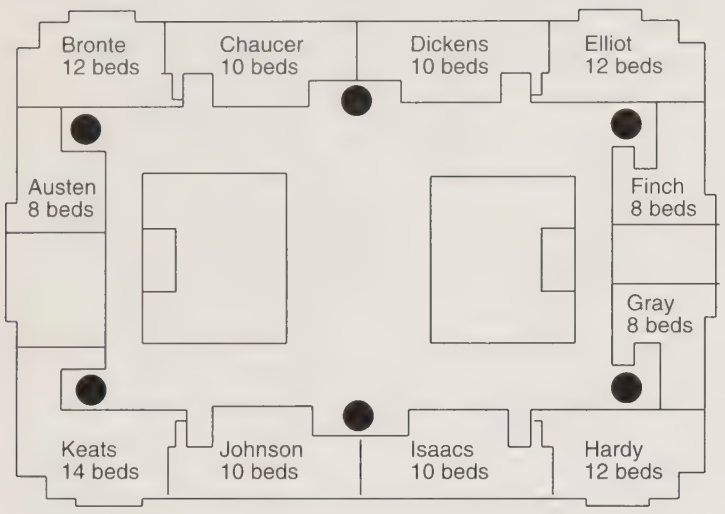
1	Single room
6	Multibedroom (6 bed)
8	WC/Washbasin
9	Ensuite shower/WC/Washbasin
10	Bathroom
11	Assisted shower
12	Assisted bathroom
13	Clean utility
14	Dirty utility
18	Dayroom
20	Kitchen
22	Trolleys
25	Nurse workstation
27	Office
28	Interview
29	Seminar room (10 persons)
30	Store
31	Staff rest room
32	Staff lockers
33	Staff pantry
34	Staff and visitors WC
42	Reception/Unit office
46	Pharmacy
47	Laboratory
48	Endoscopy suite
49	X-Ray suite
50	Ultrasound
51	Rehabilitation
53	Dirty utility/Disposal hold
55	Main equipment store



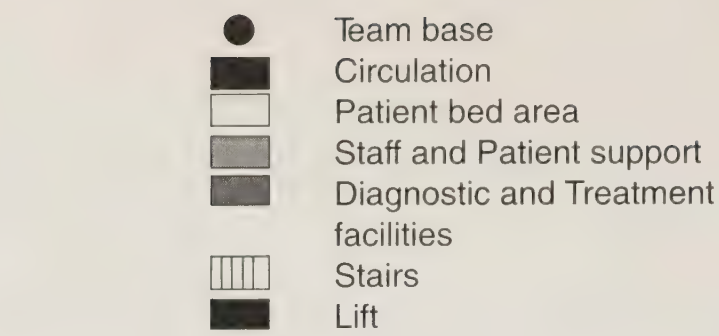
Proposed level 6
1 : 500

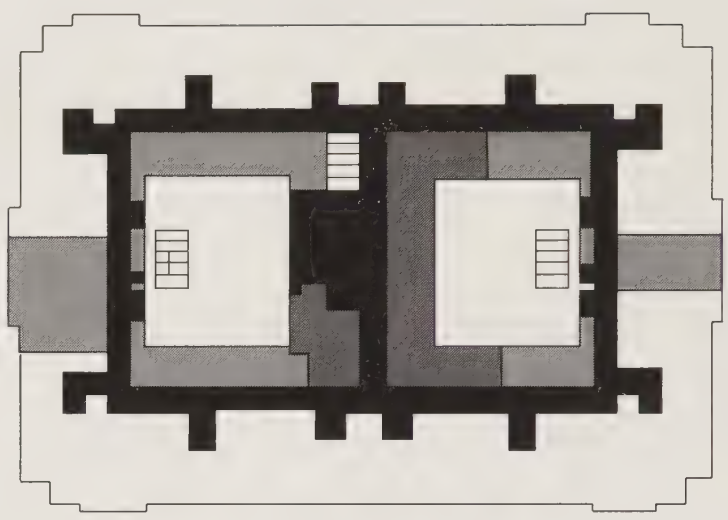


Before refurbishment: 4 wards with 120 beds



After refurbishment: 11 care teams with 114 beds





Zonal diagram.

Plan of Bronte and Austen clusters
1:200

Design

8.34 Despite the significant changes in service philosophy, physical re-organisation was kept to a minimum. The Medical Unit occupies the whole of Level 6 of the main ward block. The unit was originally divided into four wards of 30 beds in a racetrack layout around two courtyards separated by a vertical circulation core.

8.35 The outer band of accommodation contains all the bedrooms and bathrooms. These rooms have been retained in their original configuration, with the exception of ensuite facilities to all bedrooms which have been upgraded. The inner band of service rooms has been designed to support the reorganisation of in-patient services based on multi-disciplinary teams. Each quarter of the plan now accommodates three or four staffing teams with access to shared local support facilities. The central core includes the devolved diagnostic and treatment services which serve the Medical Unit.

8.36 Since the introduction of the patient-focused care approach the hospital has reviewed the use of these "near-bed" facilities and does not intend to replicate the same services for each of the other two in-patient floors. Instead, it will provide facilities more appropriate to the specialties occupying each storey.

8.37 The most significant changes are reflected in the introduction of six shared team workstations located in the circulation areas. Additional clinical workstations have been added within each of the six-bed bays. The clinical workstations have a lockable drugs cupboard, computer terminal and storage for sterile supplies which are topped up from a central store within the unit.

8.38 Each team now has closer proximity to the beds it serves; an interview room, bathroom, utility rooms and storage facilities.

8.39 The separate staff, consultants offices and administrative rooms usually associated with the traditional ward have been relocated within the circulation areas where there are increased opportunities for interaction with patients, their relatives and visitors and other team members.

Floor area allocation

8.40 Despite the physical constraints and high proportion of costs devoted to reorganising mechanical services, the allocation of space has remained constant. Four large day areas have been replaced by two smaller rooms, reducing net area per bed to 12.6m^2, which falls below the previous HBN 04 standard of 14.1m^2. Overall support accommodation remains as before, although it has been redistributed between facilities local to the six team bases and the specialist accommodation, central administration and staff diagnostic and treatment support spaces. Excluding this accommodation, the total floor area per bed has fallen to 22m^2, which is less than the previous HBN 04 standard of 22.9m^2. The rate of circulation is high at a rate of 44.2% (30.6% of the total).

Comment

8.41 The changes in the way in which services are now provided are not matched in impact by improvements to the physical environment for the patient or visitor. Resources have had to be used sparingly and the work was phased to cause least disruption to the whole building. The result appears to be barely more than routine cyclical decoration which sadly does not reflect the major changes and improvements in the delivery of patient care.

CASE STUDY 3

TRAFFORD GENERAL HOSPITAL

8.42

PROJECT INFORMATION

Region:	North West Region
Client:	Trafford Healthcare NHS Trust
Consultants:	Trafford Healthcare NHS Trust Estates Services
Project:	Conversion of existing Nightingale ward blocks for in-patient accommodation

Background

8.43 Over the past five years, in support of the objective of concentrating its primary acute services on the Trafford General Hospital site, Trafford Healthcare NHS Trust has invested in a rolling programme of extending and refurbishing its existing buildings to provide enhanced medical facilities.

8.44 The projects already undertaken include the provision of:

- a fully integrated women's unit containing Maternity and Gynaecology services;
- a new EMI day hospital;
- a new pathology unit;
- new CT scanner facilities;
- a day surgery unit;
- a medical investigation unit.

8.45 The original in-patient accommodation was concentrated in six two-storey Nightingale ward blocks located at the centre of the hospital site. The accommodation was considered to be sub-standard and did not reflect the Trust's desire to significantly reshape its pattern of service delivery.

8.46 In estate terms, the objectives of the Trust were to:

- improve the quality of in-patient accommodation by utilising sound existing structures;
- provide easily maintained buildings adaptable to future needs;
- provide ward designs sympathetic to patient-focused care;
- improve servicing and support facilities for all in-patient accommodation;
- relieve the main hospital street of theatre trolley traffic by the transposition of surgical and medical wards, and by creating dedicated theatre patient access incorporating horizontal evacuation facilities for all first floor wards;
- improve deficiencies in the existing layout;
- embrace and eliminate significant backlog maintenance;
- reduce the programmatic and decanting constraints demanded by a new-build solution;
- establish a new and uniform external image for the former late 1920s buildings;

8.47 The six former Nightingale ward blocks now provide the following accommodation:

- Admissions Assessment Unit;
- General Surgery Wards;
- Medical Wards:
  - a) medical investigation;
  - b) endoscopy;
  - c) chemotherapy;
- Orthopaedics/ENT;
- Elderly Health Services;
- Urology;
- Child Health Services.

Urology and Child Health Services incorporate OPD suites to establish Urology and Paediatric one-stop facilities. The Orthopaedic Ward will be directly linked with the Orthopaedic Theatre, achieving rationalisation of traffic flows and affording dedicated access.

Admissions and assessment unit

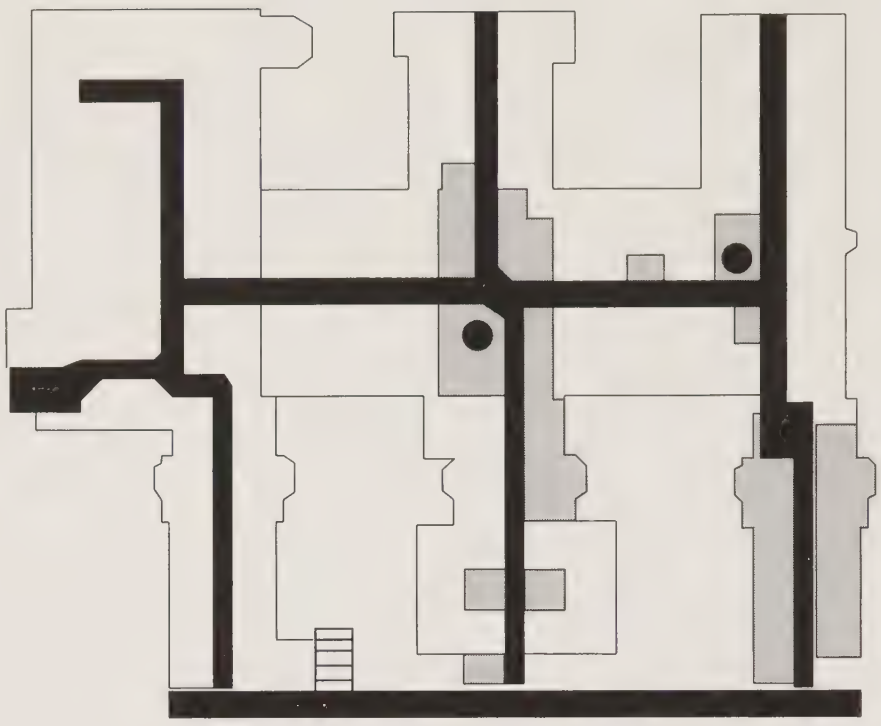
8.48 The provision of an admissions/assessment unit (AAU) at Trafford is a new development that allows a multi-disciplinary assessment of each adult patient admitted with an acute medical or surgical condition, whether referred by their general practitioner (GP) or admitted via the Accident and Emergency department (A&E). Sixteen beds are allocated: 12 for medical and four for surgical patients. There are a further six beds for the observation of patients who may not need full admission to hospital. The admissions and assessment unit has direct access to the A&E.

8.49 A comprehensive assessment is carried out by a multi-disciplinary team and a care plan then drawn up. Patients remain in the AAU for a maximum stay of 24 hours. Streamlining the patients' initial care, investigations and treatment should reduce the overall length of stay,

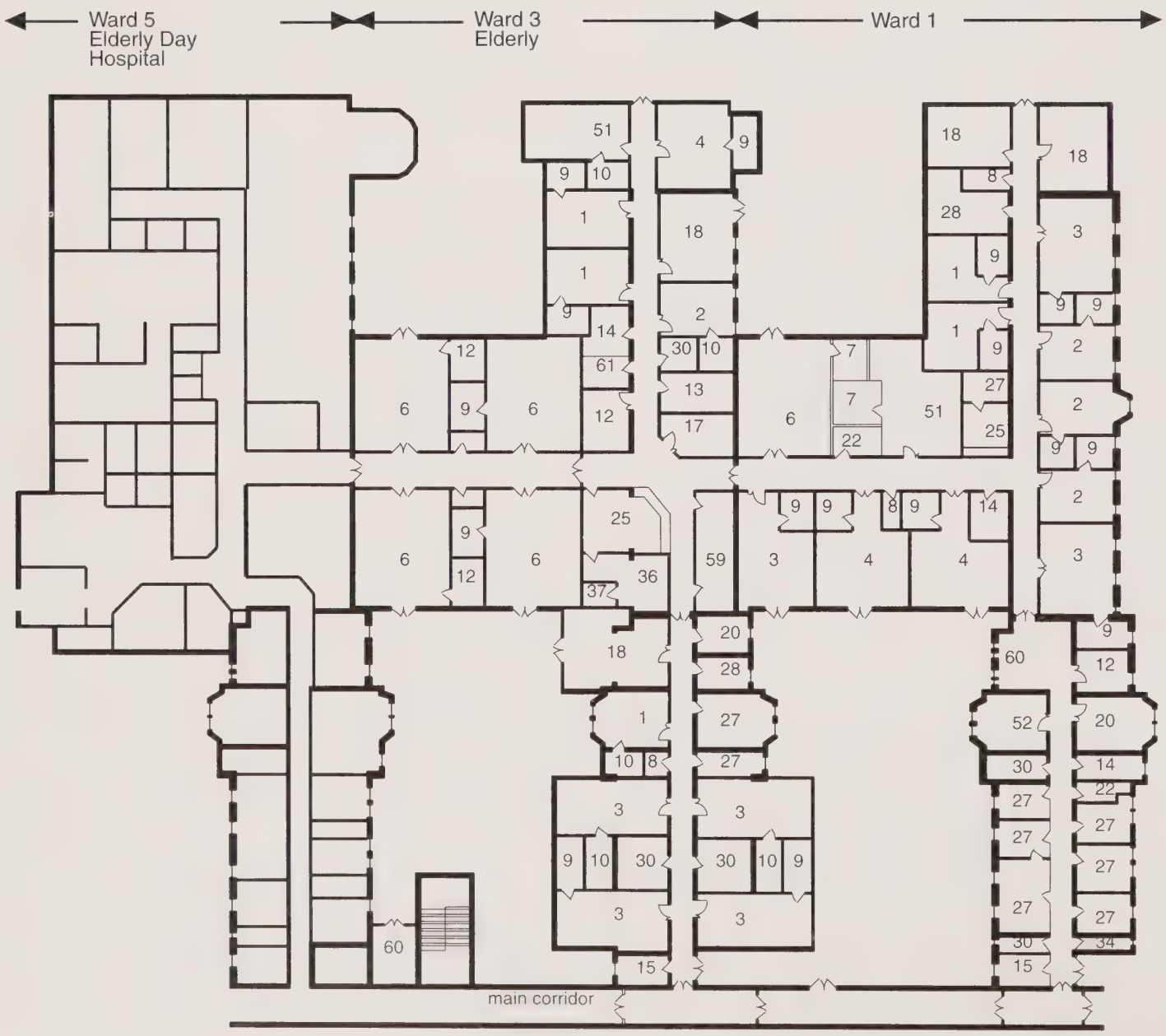
and lead to more efficient discharge planning and follow-up care. Multi-disciplinary AAU notes will ensure continuing care on relocation to a specialist ward.

8.50 Patients in the six observation beds are to be looked after by nursing staff from A&E as the care of these patients will not be intensive.

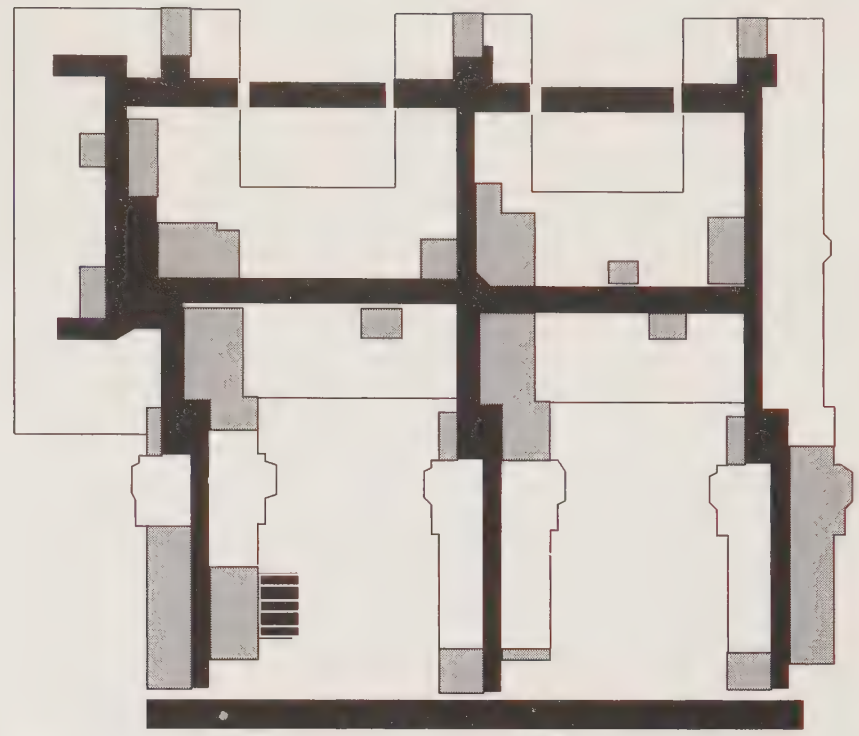
TRAFFORD HOSPITAL
Site plan
1 : 5000



1996 Reconfiguration **TRAFFORD HOSPITAL**
Ground Floor 1 : 500

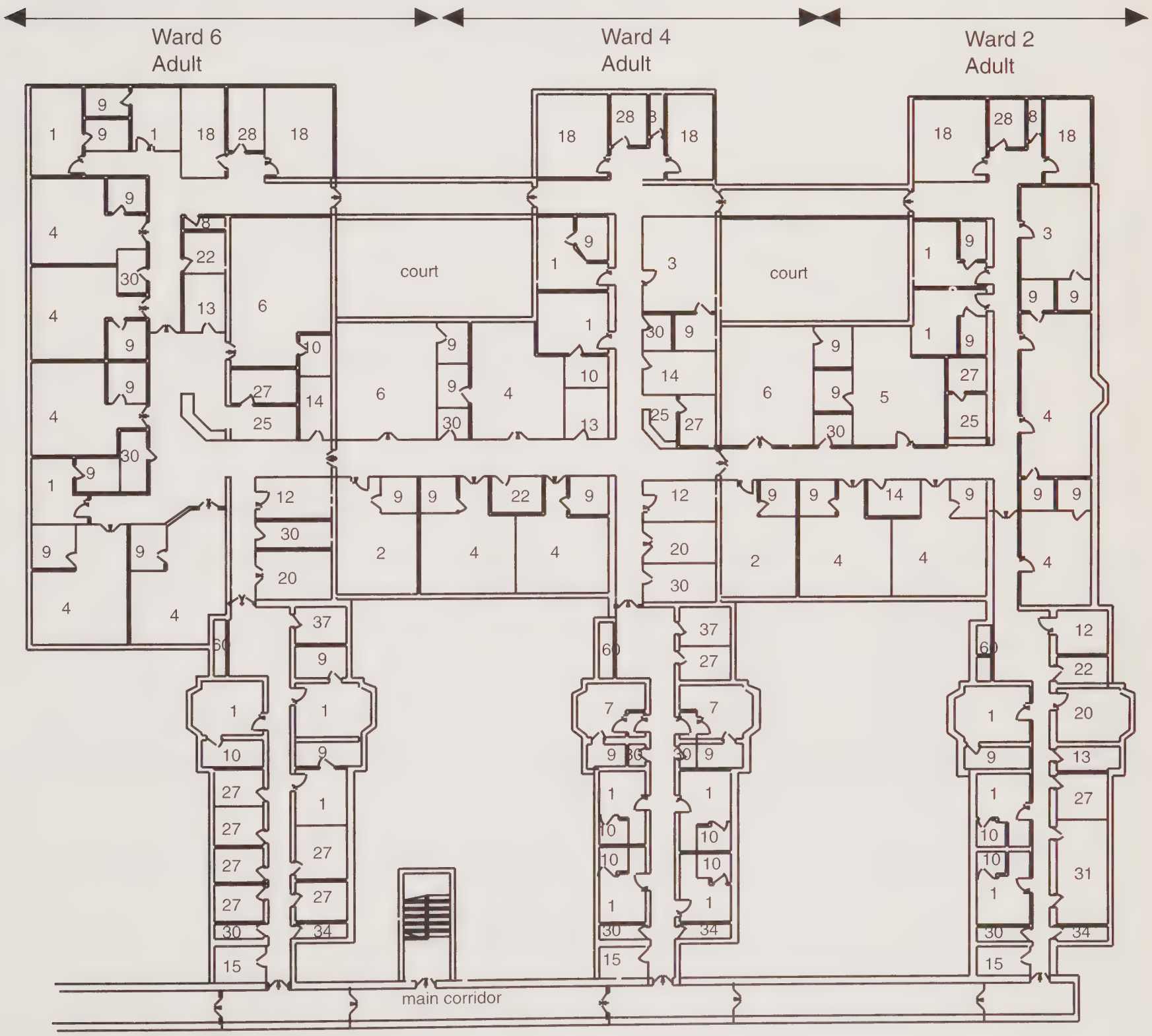


1 Single room
2 Two bedroom
3 Multibedroom (3 bed)
4 Multibedroom (4 bed)
5 Multibedroom (5 bed)
6 Multibedroom (6 bed)
7 Isolation room
8 WC/Washbasin
9 Ensuite shower/WC/Washbasin
10 Bathroom
12 Assisted bathroom
13 Clean utility
14 Dirty utility
15 Cleaner
17 Treatment
18 Dayroom
20 Kitchen
22 Linen trolley bay/store
25 Nurse workstation
27 Office
28 Interview
30 Store
31 Staff rest room
34 Staff WC
36 Female staff change
37 Staff shower
45 Multipurpose office/Meeting room
51 Rehabilitation
52 Physio
55 Main equipment store
60 Switchgear/Plant
61 Laundry

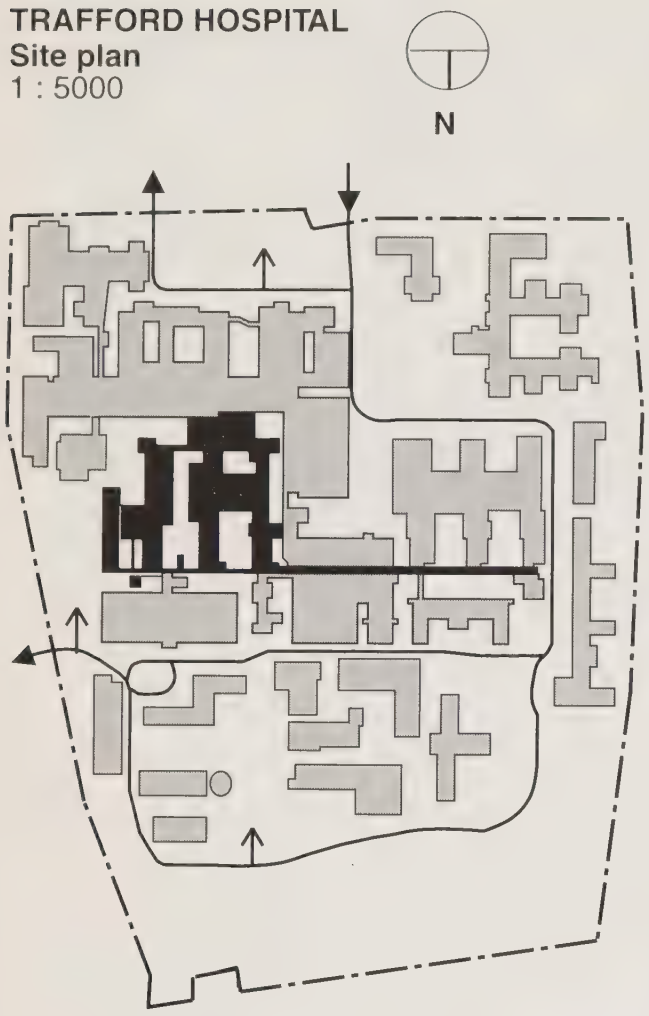


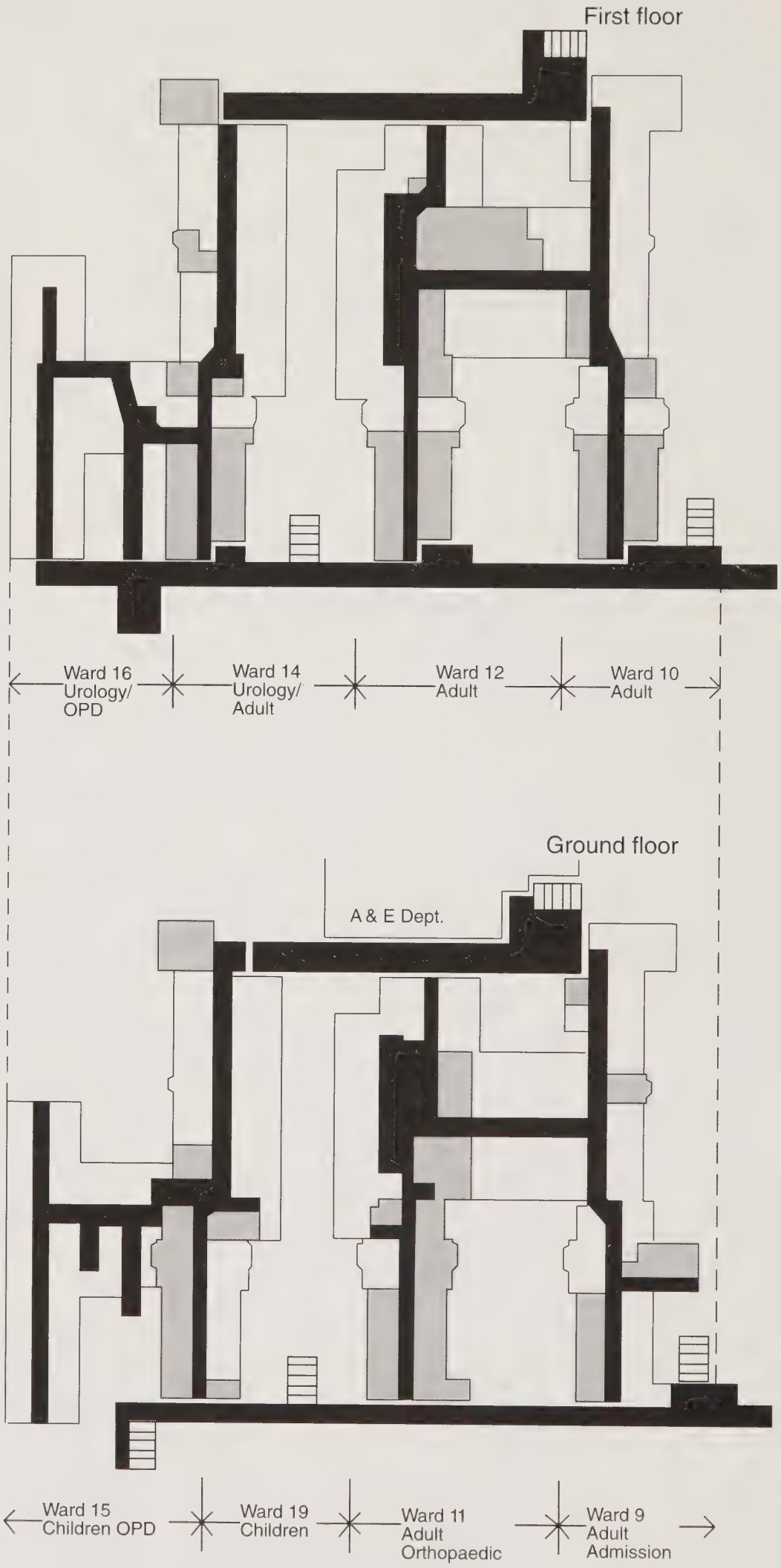
Circulation
Patient
Staff and Patient support
Stairs

TRAFFORD HOSPITAL
First Floor 1 : 500

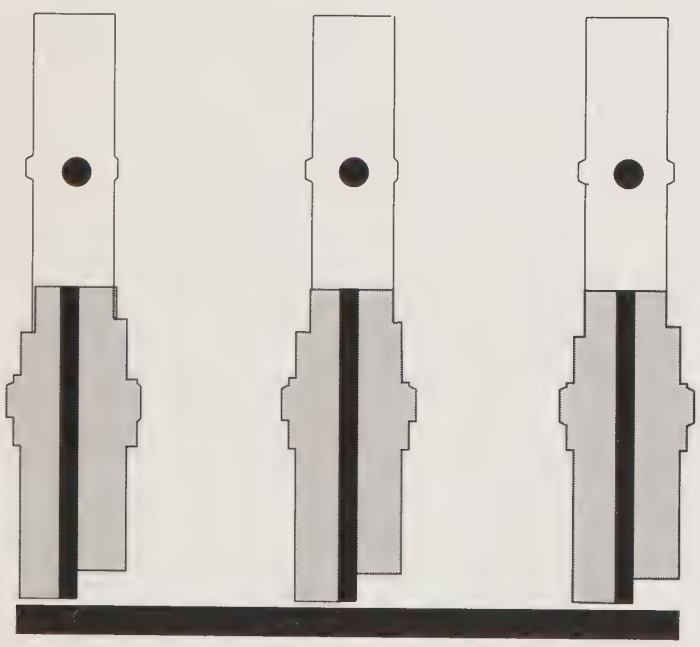


TRAFFORD HOSPITAL
Site plan
1 : 5000





Staff Base
Circulation
Patient bed area
Staff and
Patient support
Stairs



Layout of the original 1920's wards

Design

8.51 The Nightingale wards have been remodelled, extended and infilled to provide a new central circulation spine within each of the accommodation areas and a second communication corridor connecting the ends of the "fingers" to adjacent departments. Out-patient and day facilities have been brought closer to bed areas with the advantages that expertise and equipment are now more integrated for some specialties.

8.52 In the main, support facilities have not been moved from their original locations. Bed areas occupy infilled and remodelled ward ends, which have been planned in a range of multi-bed and single-bed rooms. The wards have been reconfigured in three-, four- and six-bed rooms with ensuite bath or shower rooms infilling between or adjacent to the former ward blocks, creating a new deep plan building. The majority of service rooms and all circulation spaces have been internalised and rely solely on artificial lighting and ventilation. Although nursing care is organised on a team basis, central staff workstations are located between 30 and 40 metres from ward entrances. Travel distances remain considerable, utility areas are centralised and day rooms are remote. Some beds – particularly single-bed rooms – are more than 30 metres from the staff station.

8.53 Nucleus design principles and guidance material were used for briefing the project teams. The redevelopment of the wards to accord with the patient-focused care policy framework was undertaken with close participation of the various Patient Focused Care Working Groups set up to develop detailed proposals. The underlying philosophy to the proposals was that all facilities should be capable of use by patients regardless of level of ability/disability.

Floor area allocation

8.54 All bedrooms have ensuite facilities and the support facilities conform to the standard Health Building Note schedules. The distribution of floor space between bed (55%), support (18%) and circulation areas (27%) is unsurprising as the deep plan compensates for the long corridors. Actual floor areas accord with the current standards: bed areas are $15m^2$ per bed and support areas at $5m^2$ per bed and circulation at $8m^2$ per bed.

Comment

8.55 In terms of value for money there is no doubt that the quality of finishes and decor is a vast improvement on the previous environment and sets a very high standard in comparison to many similar projects but it remains to be seen whether the new layout will successfully support the team staffing and patient-focused philosophy to which the Trust aspires.

CASE STUDY 4

NORTHWICK PARK HOSPITAL

8.56

PROJECT INFORMATION

Region:	North Thames
Client:	Northwick Park Hospital and St Mark's Hospital Trust
Consultants:	Sainsbury Wing: Richard Horden Associates Charles Kingsley Wing: NPH and St Mark's Hospital Trust Estates Department
Project:	Private in-patient accommodation

Background

8.57 St Mark's Hospital is a world renowned hospital for internal medicine specialising in the diagnosis and treatment of rectum and colon disorders and with a high reputation for endoscopy procedures.

8.58 The hospital required 18 additional single-bed rooms for the treatment of private patients, one of which was to be specifically for high dependency care. The Sainsbury Wing was developed following a number of feasibility studies undertaken by the Trust. A location for the new wing was found on the roof of a nine-storey ward block adjacent to an 18-bed private ward, the Charles Kingsley Wing, built in the early 1980s.

Design

8.59 A suite of consultation rooms for out-patients and the reprovision of reception, waiting and staff support facilities – to be shared by both private wards – has been located at the junction of the two private wings. The accommodation is reached by a new strategically placed lift connecting directly to the main hospital street as well as a separate external entrance.

8.60 Clad in aluminium and tinted glass with patient-controlled motorised sun shading, the external profile of the additional storey – the Sainsbury Wing – has distinct aeronautical influences. Although prefabricated bathroom pods, large composite structural elements and cladding, and pre-wired, pre-plumbed bedhead patient care units were incorporated in order to speed construction, more disruption was caused to the occupants of the floor below than had been originally envisaged. Stand alone air handling units and ancillary cabling are concealed within the aerodynamic aluminium roof cowl above the central corridor.

Floor area allocation

8.61 As a consequence of placing the Sainsbury Wing adjacent to the existing Charles Kingsley Wing more efficient use has been made of shared support services, reception and waiting areas.

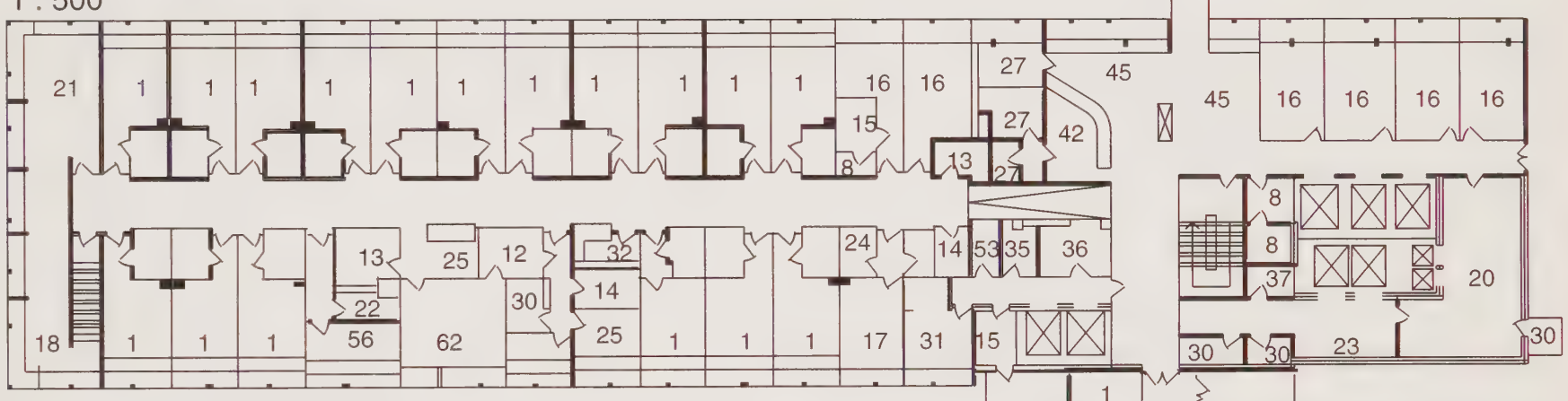
8.62 Both private wings are conventionally laid out along double-loaded corridors which lead to sitting areas and escape staircases. However the space standards of the two wings are quite different. A total of 63.5% more space per bed is provided in the Sainsbury Wing, where bedrooms with ensuite facilities account for an additional 10.9m^2 per bed – totalling 25.9m^2; there is also 5.7m^2 additional support space per bed. Circulation is roughly equivalent at 12m^2 per bed in each wing.

8.63 A more detailed examination of area reveals that the *proportion* of circulation space in Charles Kingsley is markedly high – 68% of usable space (40% of the total area). BUPA allocate 25% and 20% respectively in their standard brief. In comparison, the Sainsbury Wing does not seem excessive with figures of 36% and 27% respectively.

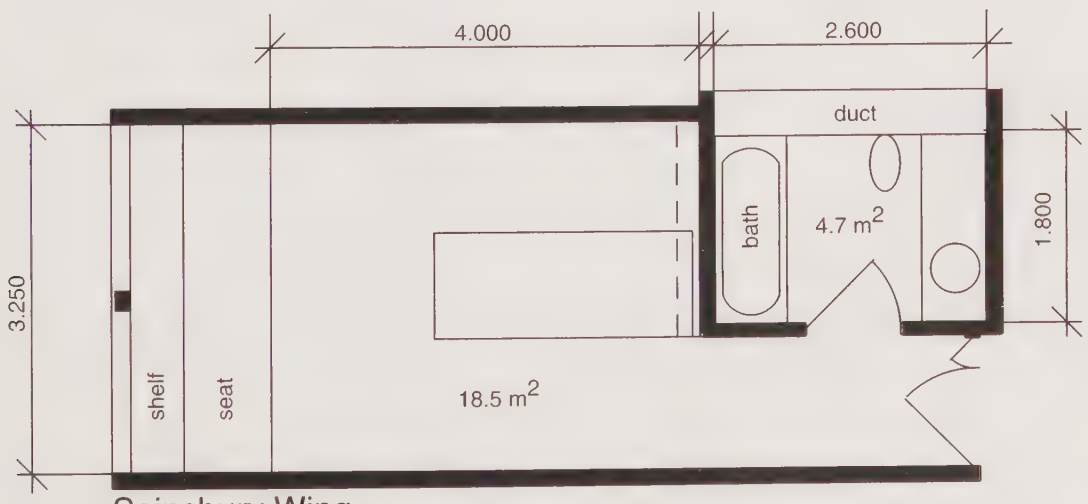
8.64 While the proportion of space devoted to bed areas is similar, the proportion of space in the Sainsbury Wing for support areas is 18% – more than double that of the Charles Kingsley. This may be explained by the inclusion of a treatment suite for carrying out endoscopies and the provision of significantly more office space and storage. For comparative purposes the 100m2 of additional shared support accommodation is separately scheduled.

Site plan 1 : 5000

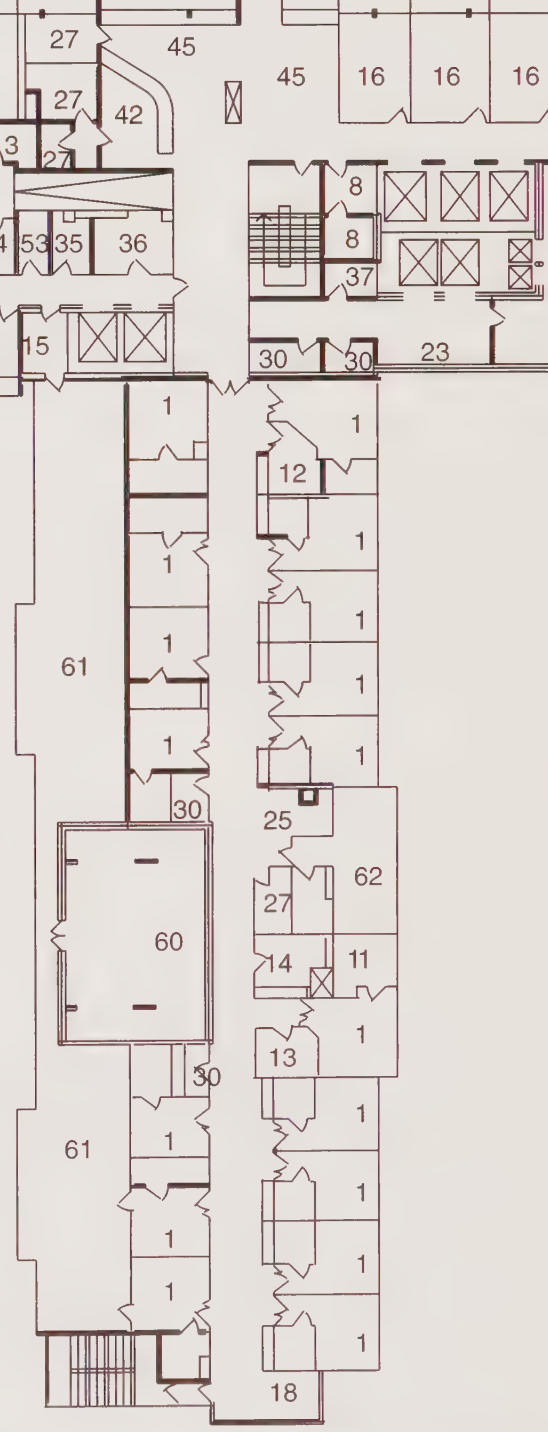
ST. MARK'S HOSPITAL
Sainsbury Wing
1 : 500



1 Single room with ensuite
11 Assisted shower
12 Assisted bathroom
13 Clean utility
14 Dirty utility
15 Cleaner
16 Consult
17 Treatment suite
18 Dayroom
20 Kitchen
21 Dining
22 Linen trolley bay/store
23 Food trolley bay
24 Recovery
25 Nurse workstation
27 Office
28 Interview
30 Store
31 Staff rest room
32 Staff base/Ward clerk
35 Male staff change
36 Female staff change
37 Staff shower
42 Reception/Unit office
43 Waiting area
53 Dirty utility/Disposal hold
56 Main equipment store
60 Switchgear/Plant
61 Balcony
62 High dependency
63 Exam



Sainsbury Wing
Single bedroom with en-suite 23.2 m²



NORTHWICK PARK HOSPITAL
Charles Kingsley Suite
1 : 500

CASE STUDY 5

NUCLEUS – Exemplar design for in-patient accommodation

Background

8.65 The Nucleus design for adult acute in-patient accommodation was first published in 1977 and contained 28 beds. Each template contained two 28-bed wards arranged back-to-back. The design had been influenced by HBN 04 – 'Ward units' (1968), previous work on standardising hospital design ('Best Buy' and 'Harness'), the need for greater energy conservation and a requirement to cut public spending during the mid-1970s.

8.66 A prototype Nucleus adult acute ward was opened at Pinderfields General Hospital in 1980. The first Nucleus hospital which included adult acute wards was opened in 1982. The lessons learned from the evaluation of wards built to the 1977 design were incorporated into the last edition of HBN 04 – 'Adult Acute Wards', published in 1990. Nucleus was subsequently revised in 1990: a new 24-bed ward reflected the latest thinking in the design and management of in-patient accommodation. The aim was to achieve higher patient throughput, shorter lengths of stay and lower running costs.

8.67 The revised design increased the gross floor area by 10% and reduced the number of beds. Bedrooms were designed to accommodate high dependency patients. The number of single-bed rooms was increased from four to six, with the remainder in six-bed rooms as before. Five ensuite showers with WCs were included to serve the 24 beds. The staff base and equipment storage were doubled in size and a pantry and treatment room were included in each ward. It was anticipated that the new ward of 24 beds would accommodate the same workload the earlier 28-bed ward.

8.68 During 1994 a study was undertaken by NHS Estates to investigate an entirely single-bed room accommodation using the Nucleus template. A number of models were developed ranging from a suite of 20 critical/intensive care rooms of which 60% had ensuite shower rooms, to a layout containing a maximum possible 34 beds, 82% of which had ensuite facilities.

8.69 The study reflected the team staffing concept by the introduction of local workstations within bed clusters. Generally support services were significantly reduced with the exception of the template extension pod which accommodated offices, staff changing and overnight stay areas for relatives.

Single-bed room option

8.70 The layout illustrated opposite builds on this earlier work to accommodate 32 beds, each with ensuite shower WC and washbasin. The layout can be adopted to include an eight and two six-bed clusters instead of two ten-bed groups although the same principles for means of escape apply.

8.71 A combination of six-, eight-, 10- or 12-bed clusters can therefore be accommodated within a single template. Lateral connection to adjacent templates allows larger staffing units to be configured.

8.72 Three templates can accommodate up to 84 beds allowing additional optional support services in the central template. Alternatively, support services may be distributed across two or all three templates.

8.73 Two templates would accommodate 52 to 64 beds depending on the additional support services desired.

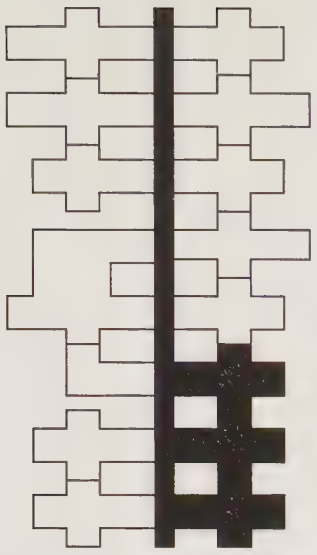
8.74 There are now over forty hospitals which include the 1977 and 1990 designs for in-patient accommodation in completed Nucleus templates. In recognition of the desire to upgrade this stock in the future, the accompanying illustrations show a method of achieving a single-bed room solution.

Floor area allocation

8.75 The distribution of floor space between bed (59.7%), support (9.6%) and circulation (30.7%) is influenced by the need to provide for horizontal evacuation in the case of fire. The prow of the template contains two back-to-back corridors which increases the overall proportion of circulation at the expense of bed areas.

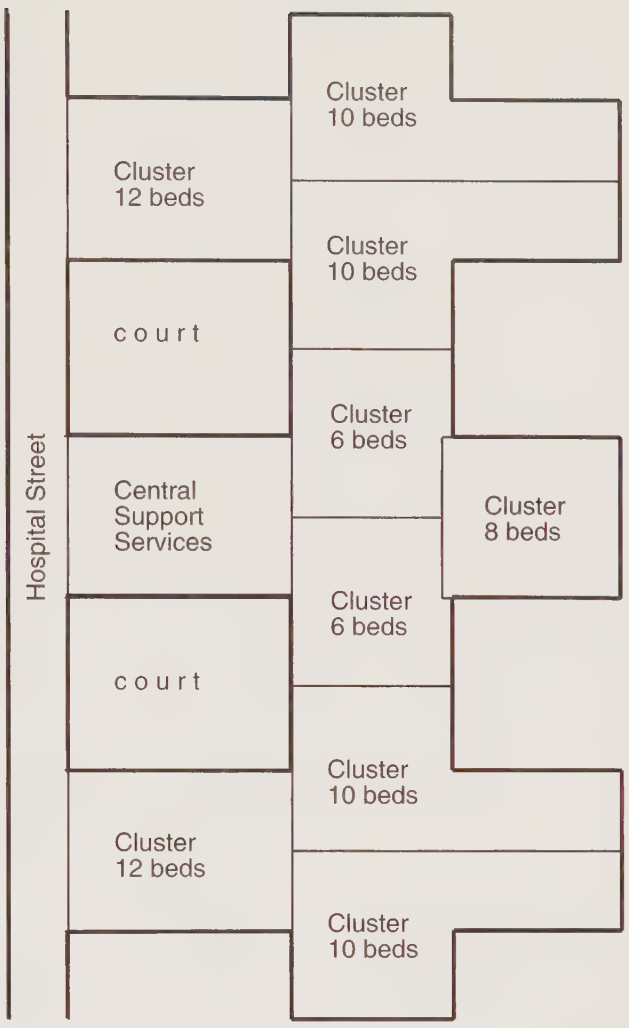
8.76 Mean bed areas are below the preferred size anticipated in exclusively single-bed room accommodation with 20m^2 per bed and a support area of 2.7m^2 per bed reflecting an increase in support activity within the bedroom. Circulation is relatively high, 11.8m^2 per bed. Further detailed planning refinements would be expected to regain the balance.

8.77 The circulation space is articulated to reinforce the idea of clustering and to provide alcoves outside the bedrooms. An alternative option to reprovide this space within the single-bed rooms would result in an unpleasant internal environment which is, consistent with all Nucleus layouts, an artificially lit corridor.

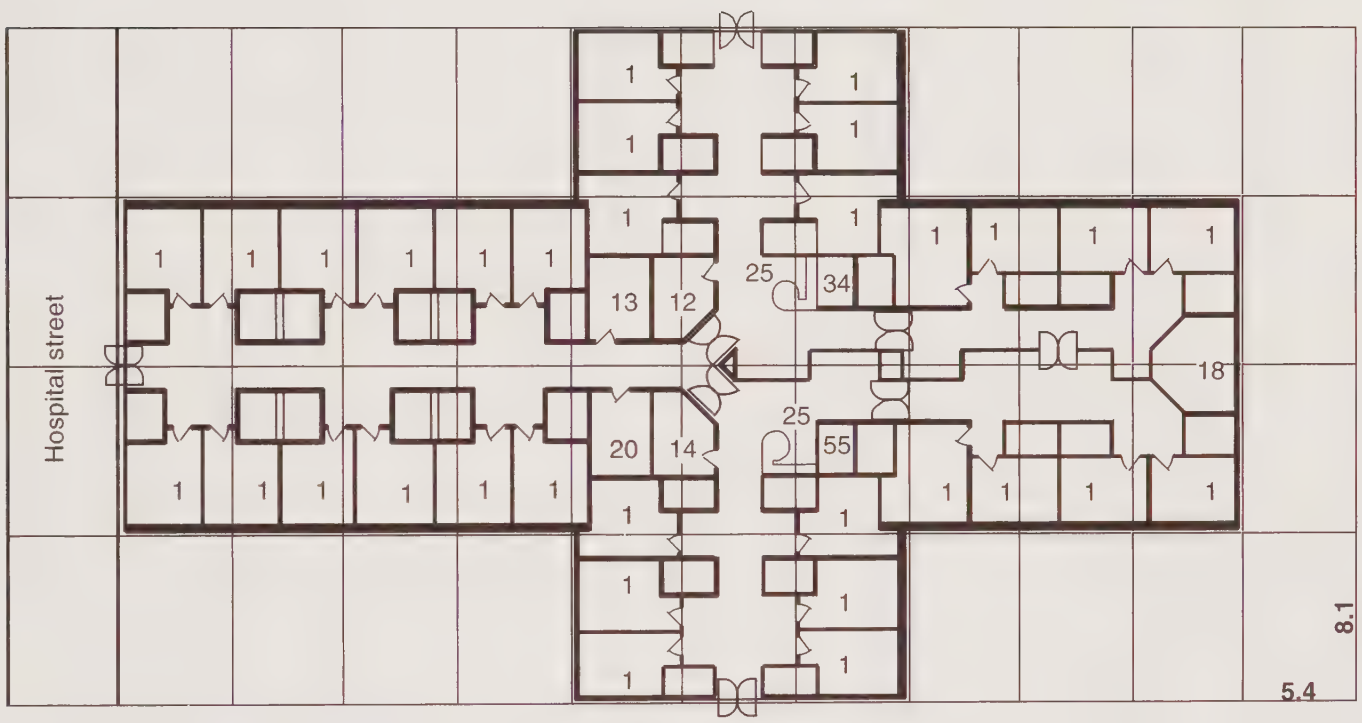


Nucleus Hospital - Typical Arrangement
1 : 5000

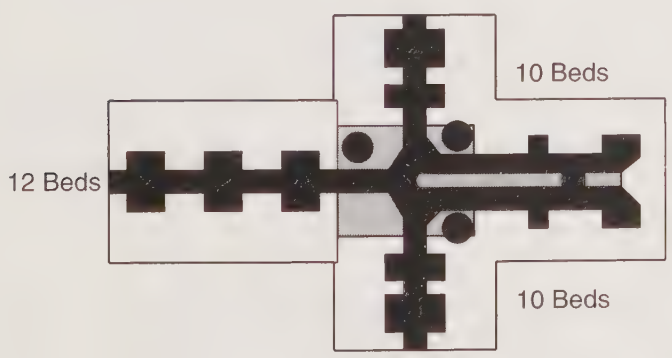
1 Single room with ensuite
12 Assisted bathroom
13 Clean utility
14 Dirty utility
18 Dayroom
20 Kitchen
22 Linen trolley bay/store
25 Nurse workstation
34 Staff and visitors WC
55 Main equipment store



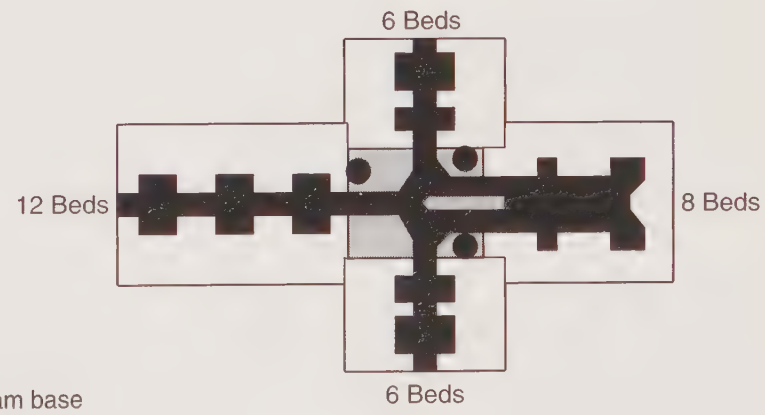
Operational Unit
72 - 84 beds



NUCLEUS Single template 32 Bed Unit 1 : 500



Layout of the 32 bed unit for 10 and 12 bed clusters



Layout of the 32 bed unit for 6, 8 and 12 bed clusters

Team base
Circulation
Patient
Staff and
Patient support

Conclusions drawn from case studies

8.78 The orientation of the bed and its precise location within a single-bed room affects the space available for access, circulation, clinical activity and observations to and from the room. At **Poole** the combination of an internal bathroom and the preferred bed position has produced a room layout which provides inadequate space for the range of equipment and clinical activity which may be required. The multi-bed rooms are also too small and do not include ensuite toilet facilities. This is reflected in a disproportionate rate of circulation space (42%).
This high proportion is caused by the configuration of the original envelope and the engineering requirements of self-contained bedroom clusters. Poole clearly demonstrates that a building designed originally for multi-bed room layouts with an average of 25% circulation is inefficient in design terms for single-bed room solutions.

8.79 The theoretical single-bed room option developed for the Nucleus template enjoys a higher proportion of patient bed area (63%) than either of the private wards visited but this is comparable with the average of 61% obtained from an analysis of other built private hospitals in the UK.

8.80 The two private Wings at **Northwick Park** and **St. Marks** hospitals illustrate the changing requirements of in-patient accommodation over the past decade.

8.81 The **Charles Kingsley Wing** provides, essentially, hotel accommodation for pre- and post- elective operations without catering for the most acutely ill or high dependency patients. It conforms to the standard private ward format both in its space provision and decor. By contrast, the more recent **Sainsbury Wing** provides larger rooms, which can accommodate more equipment at the bedside, and specialist support facilities together with a high dependency room. Although circulation area per bed is the same at $12m^2$, their respective proportions of circulation are quite different with more usable space served in the **Sainsbury Ward**

8.82 Overall, despite the enormous disparity in cost which is dealt with elsewhere, this newer wing offers a greater range of features, a more efficient layout and probably has the potential to cater for a broader range of patient acuity.

8.83 **Trafford General Hospital** has adhered closely to existing guidance and area standards contained in HBN 04 (1990). The emphasis was to realise an attractive and comfortable ambience in a decorative style which it has acheived with some panache. However, the retention of the original Nightingale structures within the new configuration has compromised the efficiency of the layout in that travel distances between key areas are considerable. In addition, the circulation areas remain wholly internal and multi-bed rooms are deep plan so that artificial lighting is required at all times and external views are limited. The use of six-bed bays with access to ensuite facilities directly from the bed areas continues to challenge patients' preference for more privacy.

8.84 The **Poole** and **Kingston** projects involve more radical models of patient care albeit realised in manifestly contrasting designs and budgets. Both are housed in buildings originally constructed in the 1970s. **Poole** was almost completely gutted and reconfigured specifically to the new model of care from which a detailed brief was derived. At **Kingston** the layout has been altered more discreetly with significantly less impact on the general ambience of the unit. A balance has had to be struck: the cost of removing physical obstacles and reorganising building services in order to facilitate the development of new patient protocols has resulted in an extremely understated design.

8.85 The case studies demonstrate the different objectives and emphases of trusts when modifying in-patient accommodation. None pretend to have the "perfect" solution – although all believe that the best solutions within the local constraints have been achieved.

8.86 The wards compared in the table opposite, with the exception of those at Kingston and Trafford hospitals, have gross bed areas ranging from $29m^2$ to $46m^2$ per bed. Area per bed space ranges from $15m^2$ to $25m^2$. Rates of circulation vary significantly and no general conclusions can be drawn.

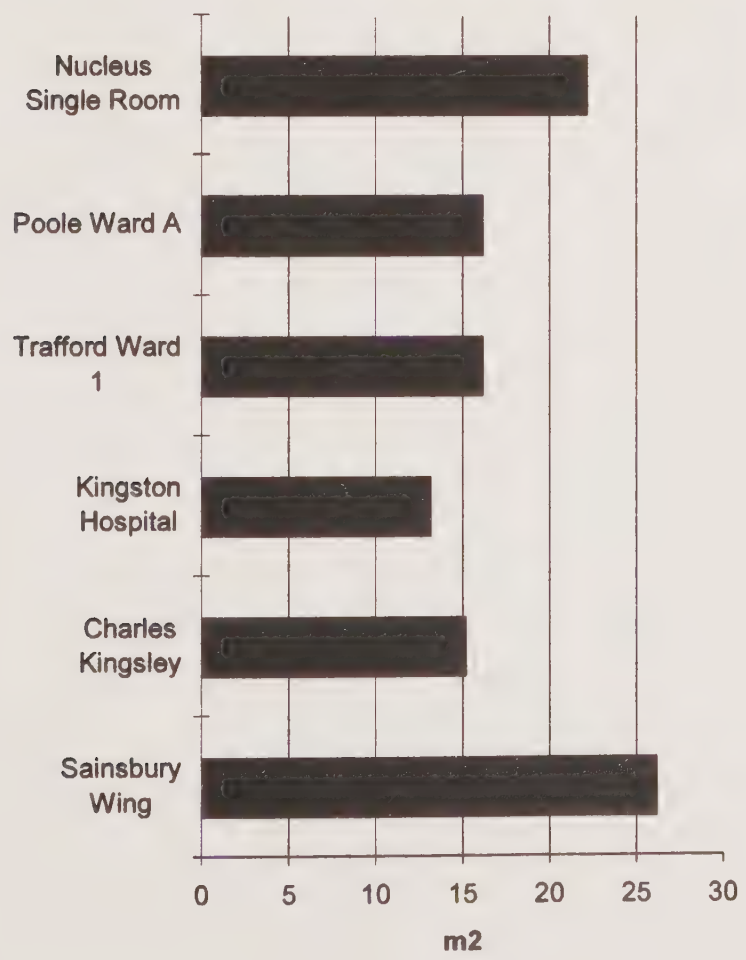
8.87 Analysis of a typical single room private hospital ward in the UK indicates a gross area per bed of approximately $30m^2$, with a bed space area of $20m^2$. Single-bed room wards in North American and European hospitals provide similar net areas of $20m^2$ but a wider range of gross areas of between $25m^2$ to $45m^2$, reflecting the increased level of support functions at the bedside and the more generous circulation space.

8.88 In the study, the only single-bed rooms which have adequate space for a desirable range of actvities are the Sainsbury Wing and the Nucleus Exemplar. Trafford merely complies with existing guidance, whereas Kingston is tight on bed space, particularly in the single-bed rooms. (*See graph* "To show immediate bed space area in wards of the case studies".)

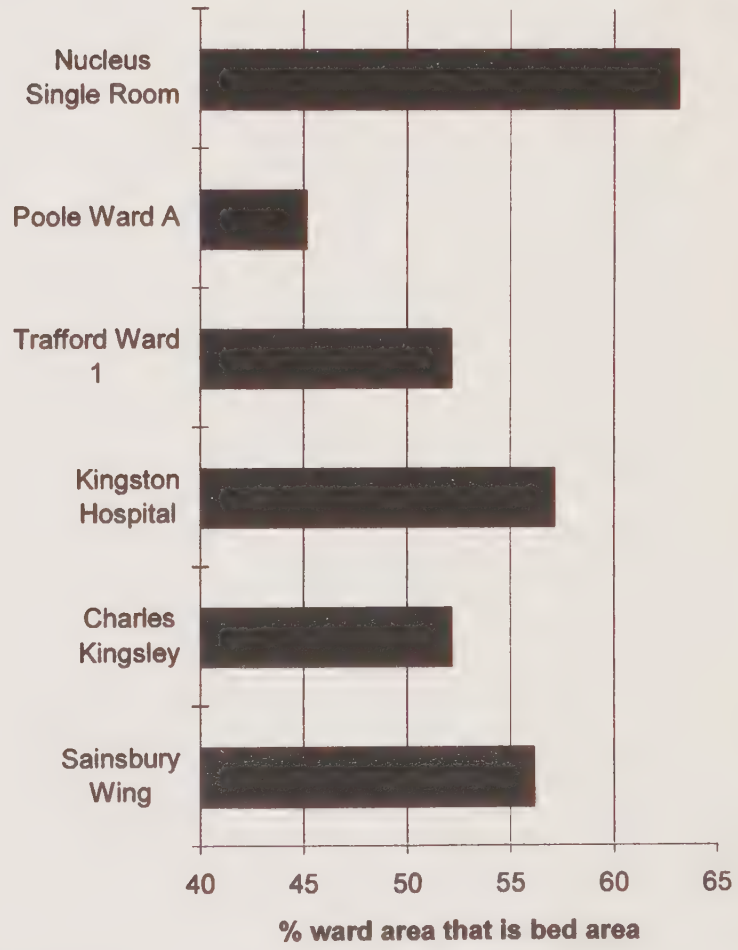
8.89 The graph "To show total bed space as a percentage of total floor area in wards of the case studies" shows that the proportion of space given over to bed area can fall significantly when refurbishment is undertaken. Reproviding single-bed rooms at Poole clearly demonstrates the potential planning inefficiencies of re-using existing buildings.

COMPARATIVE WARD STUDY Influence of form on Area	Robert & Lisa Sainsbury Wing (Private), St. Mark's Hospital, Harrow, 1995	Charles Kingsley Suite (Private), Northwick Park Hospital, London, 1992	Single Bed Ward, Option 1, Nucleus Template	Kingston Hospital, Esher Ward	Ward 1, Trafford Hospital, Manchester, 1996	Reconfigured Ward A, Poole Hospital, 1996
Type	Linear	Linear	Cruciform	Racetrack		
Number of nurse bases	1	1	4			4
Size of nursing unit	1x18	1x18	4x8			6+8+2x7
Total number of beds	18	18	32	114	32	28
Single beds	18(100%)	18 (100%)	32 (100%)	24 (21%)	3 (9.4%)	16 (57%)
Bed area	465	271	656.6	1431	526.9	435
Area per bed	25.83	15.06	20.52	12.55	16.47	15.54
Support Areas	144.4	41.4	105.1	306.9	255.75	126
Support area per bed	8.02	2.30	3.28	2.69	7.99	4.50
Sub-total	609.4	312.4	761.7	1737.9	782.65	561
sub-total area per bed	33.86	17.36	23.80	15.24	24.46	20.04
Circulation	221.4	212	338.3	767.9	226.35	409
Circulation per bed	12.30	11.78	10.57	6.74	7.07	14.61
Total	830.8	524.4	1100	2505.8	1009	970
Total area per bed	46.16	29.13	34.38	21.98	31.53	34.64
% rate circulation	36.33	67.86	44.41	44.19	28.92	72.91
Max dist. from nurse base	20.00					15.00
% bed area of total	55.97	51.68	59.69	57.11	52.22	44.85
% support area of total	17.38	7.89	9.55	12.25	25.35	12.99
% circulation of total	26.65	40.43	30.75	30.64	22.43	42.16

Graph to show immediate bed space area in wards of the case studies



Graph to show total bed space as a percentage of total floor area in wards of the case studies



9. The evidence base

9.1 The following chapters provide a background of research and study material on design and environmental issues relating to in-patient healthcare.

9.2 This will support debate at project and design team level to arrive at appropriate decisions in the local circumstances. It will also enable team members to find a route to more detailed comprehensive material.

Space configuration

9.3 In the past in the UK room sizes have been finely tuned in relation to the proposed activities of the various spaces. A "tight" fit has been sought as a means to an overall space economy and through this an economic initial capital outlay.

9.4 Planning precisely, however, can lead to an inflexible space that cannot be used in any way other than that originally intended.

9.5 This section demonstrates the impact of different room layouts on working areas and observation and the implications of different configurations on the building envelope.

Bedroom dimensions

9.6 The minimum widths of two- and four-bedded rooms are 3.7m and 7.2m respectively. Single-bed rooms require twice the length of external wall and corridor of two- or four-bedded rooms, so are not viewed as efficient in space terms. It is possible to limit the overall increase in floor area of single-bed rooms by limiting the width. This study establishes that the minimum acceptable width is 3.4m, which allows 1.2m on either side of the bed. However, this carries the penalty of an unsatisfactory arrangement of activity zones, and the placing of the window behind the patient with limited options for locating ensuite facilities.

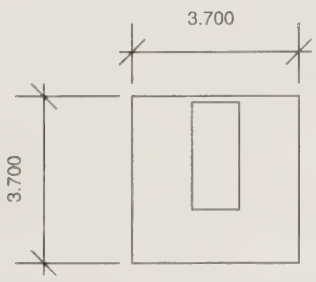
Orientation

9.7 The position of the bed influences the extent to which a patient can see out and be seen. The ability to see the daily activities within an in-patient area may provide a stimulating alternative to the views through the external window, offering the patient the opportunity to "participate" in the life of the nursing unit without needing to leave the bed. However privacy is also a factor in the planning of in-patient areas and designs need to balance these factors.

Bedroom dimensions

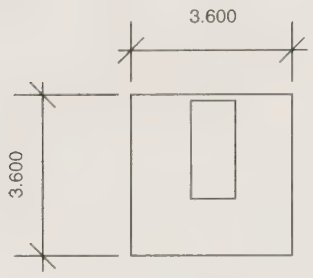
Working areas around a bed

area 13.69 m^2



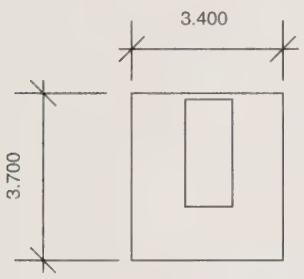
Dimensions and proportions for room with maximum bed positions

area 12.96m^2



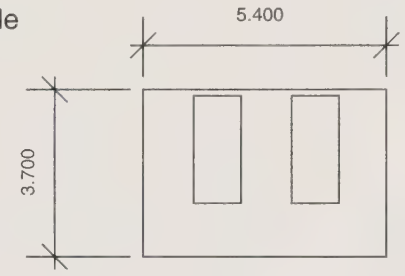
Optimum dimensions and proportions for room with bed positions commonly found in Europe

area 12.58 m^2



Single

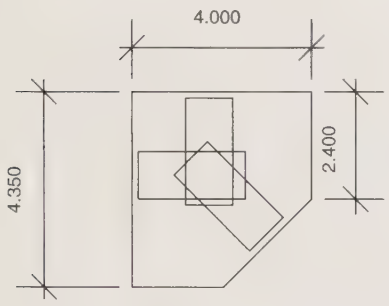
area 24.02 m^2



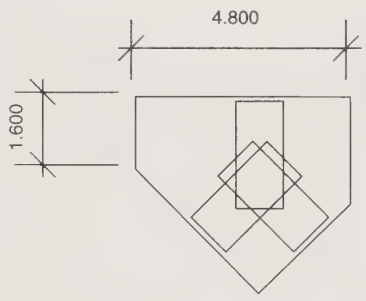
Double room

Dimensions around bed/beds with fixed orientation

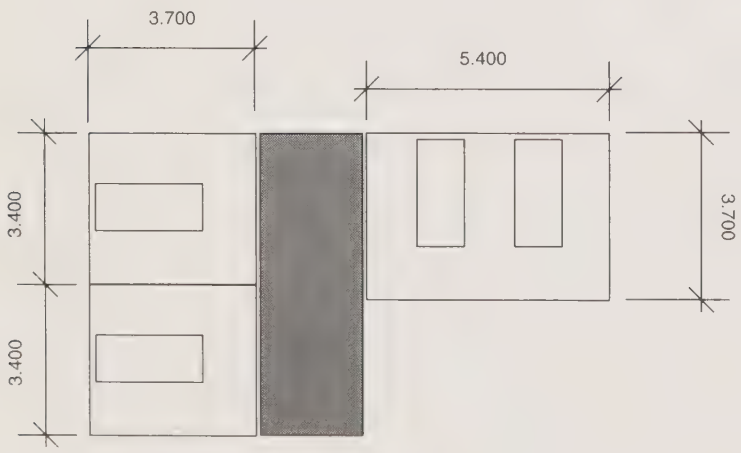
area 15.6 m^2

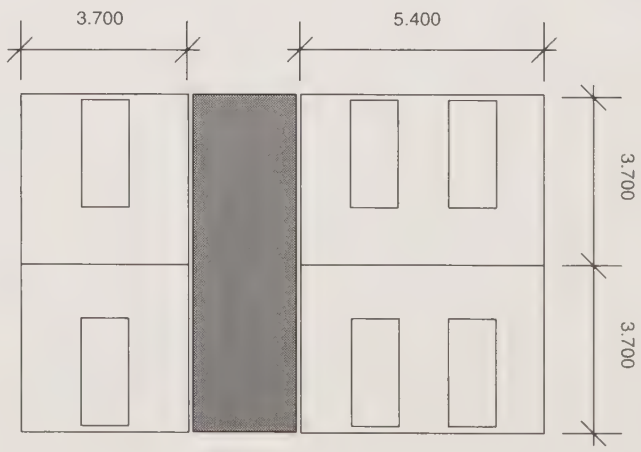


area 14.83 m^2



Flexibility in the position of the bed is shown above in two room shapes which meet minimum working areas. These types of room plans have been used in close-packing cluster designs.





Ensuite bathrooms options for single-bed rooms

9.8 The combination and integration of ensuite facilities affects not only the gross/nett floor area per bed, but also the proportion of circulation, external wall area and wall-to-floor ratio, which together have a bearing on capital costs as well as operational concerns.

9.9 A comparison of bathroom options in linear arrangements of bedrooms shows the effect of bathroom location on total floor area, circulation and floor-to-wall ratios. These, together with the engineering requirements, will affect the overall building costs. The benefits are outlined for each of the illustrated layouts. (See page 64.)

9.10 Figures (a) and (d) contain the highest floor area but include the highest proportion of circulation space.

9.11 Figure (a) has the highest floor-to-wall ratio at 1:0.76, compared to (b) and (c) which have 1:0.52. Figures (b) and (c) contain the most floor area and (c) uses space least effectively and permits the poorest observation into the room.

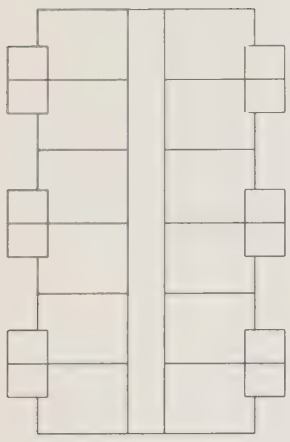
9.12 Linear layouts may appear to be more economical, but are less efficient in their use of space than centric clustering arrangements.

9.13 In the illustrated examples, the floor-to-wall ratios range from 1:0.41 up to 1:0.63. All the examples incorporate external projecting bathrooms.

9.14 Minimising gross floor area <u>increases</u> the floor-to-wall ratio and vice versa. A <u>high</u> floor-to-wall ratio may well be generated despite efficient and functional space planning. Economic solutions aim to optimise both the gross floor area and external wall area for any given layout.

Ensuite bathroom options for single rooms

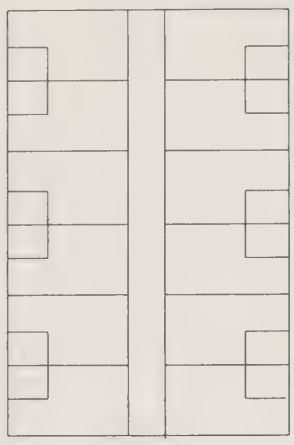
a



External bathroom 1

Total area = 331.0 m^2
@ 27.64m2 per bed
Circulation =63.3 m^2
(inc walls and ducts @ 10 m^2)
Bedrooms = 267.7 m^2
External wall =84.0 lin. m
% circulation 23.0
external wall area= 252 m^2
Ratio floor/wall= 1:0.76

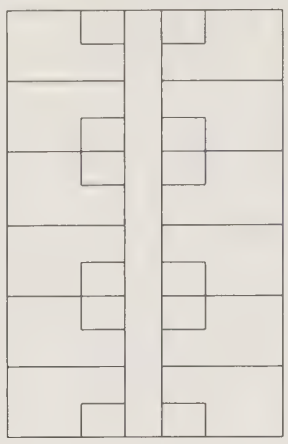
b



External bathroom 2

Total area = 351.0 m^2
@ 29.24m2 per bed
Circulation = 63.3 m^2
(inc walls and ducts @ 10 m^2)
Bedrooms =287.7 m^2
External wall = 62 lin. m
% circulation = 22.0
external wall area = 186 m^2
Ratio floor/wall = 1:0.52

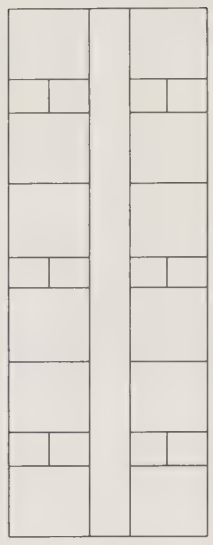
c



Internal bathroom

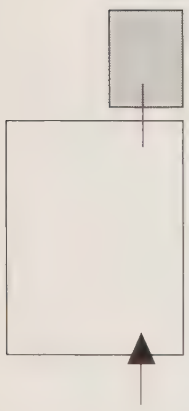
Total area = 351.0 m^2
@ 29.24m2 per bed
Circulation = 63.3 m^2
(inc walls and ducts @ 10 m^2)
Bedrooms =287.7 m^2
External wall = 62 lin. m
% circulation = 22.0
external wall area = 186 m^2
Ratio floor/wall = 1:0.52

d



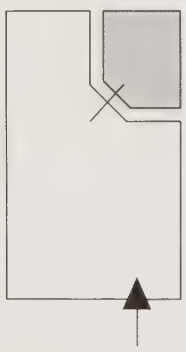
Interlocking bathroom

Total area= 330.0 m^2
@27.50m2
Circulation= 87.0 m^2
(inc walls and ducts @20m2)
Bedrooms= 243.0 m^2
External wall= 68 lin. m
% circulation= 35.0
external wall area= 204.0 m^2
Ratio floor/wall= 1:0.61



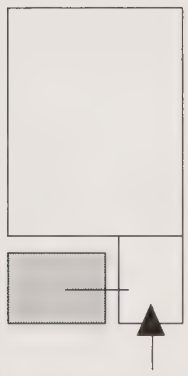
External bathroom 1
(outside envelope)

- good observation to and from room
- efficient circulation
- minimum room width
- natural light and ventilation to bathroom
- reduces window area in bedroom
- bathroom service duct could be accessed externally
- can be bolted onto an existing building



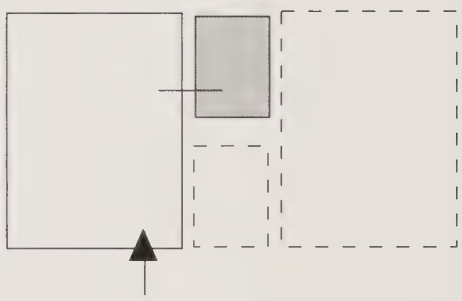
External bathroom 2
(within envelope)

- good observation to and from room
- efficient circulation
- minimum room width
- natural light and ventilation to bathroom
- reduces window area in bedroom
- bathroom service duct could be accessed externally
- increases floor area



Internal bathroom

- reduces observation to andfrom bedroom
- creates dead area behind doors
- increases area of unusable floorspace
- maximises window area in bedroom
- bathroom serviceduct can be maintained from corridor



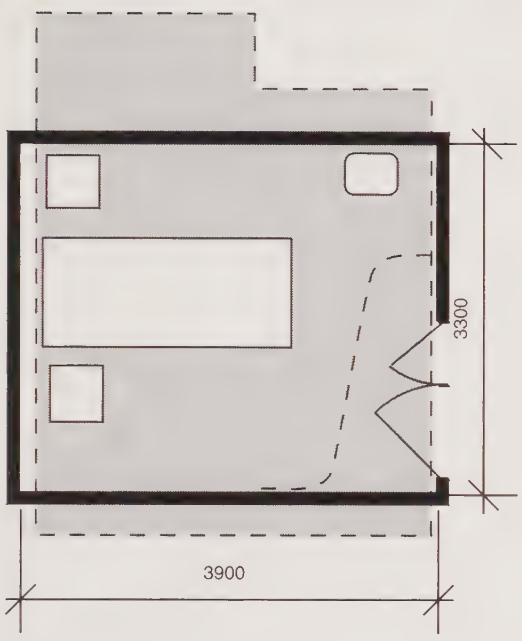
Interlocking bathrooms

- good observation to and from room
- one internal bathroom per two bedrooms
- increases overall width of room
- maximises window area in bedroom
- one service duct has to be accessed from room

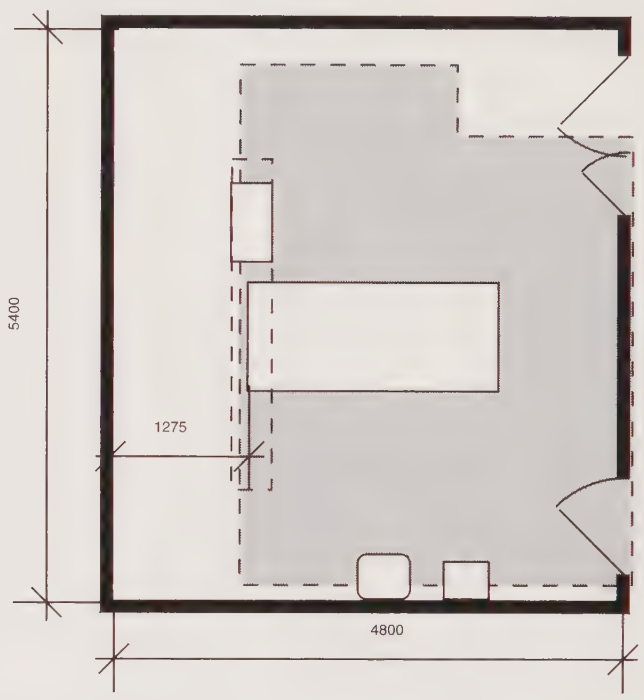
Single-bed room designs in NHS guidance

9.15 Previous planning guidance for single-bed rooms (HBN 04 1990 and HBN 40 1995) is compared to a single-bed room with ensuite and integral support facilities. The single-bed room is larger to accommodate the additional bedside activity and equipment. The increase in area over HBN 04 (1990) and HBN 40 is between 32% and 50%.

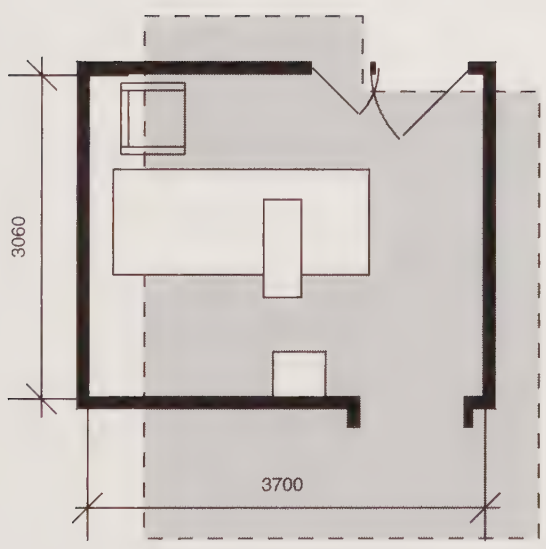
Single room
HBN 04 1990
area 12.87m^2



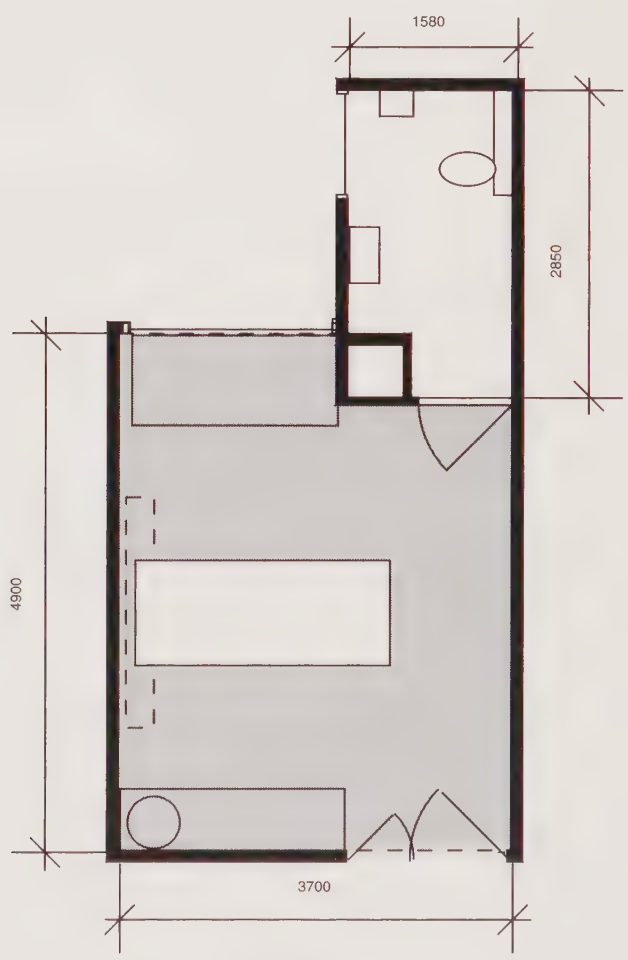
ITU/Isolation room
Nucleus data pack 1992
area 25.92m^2



Single room
HBN 40 1995
area 11.32m^2

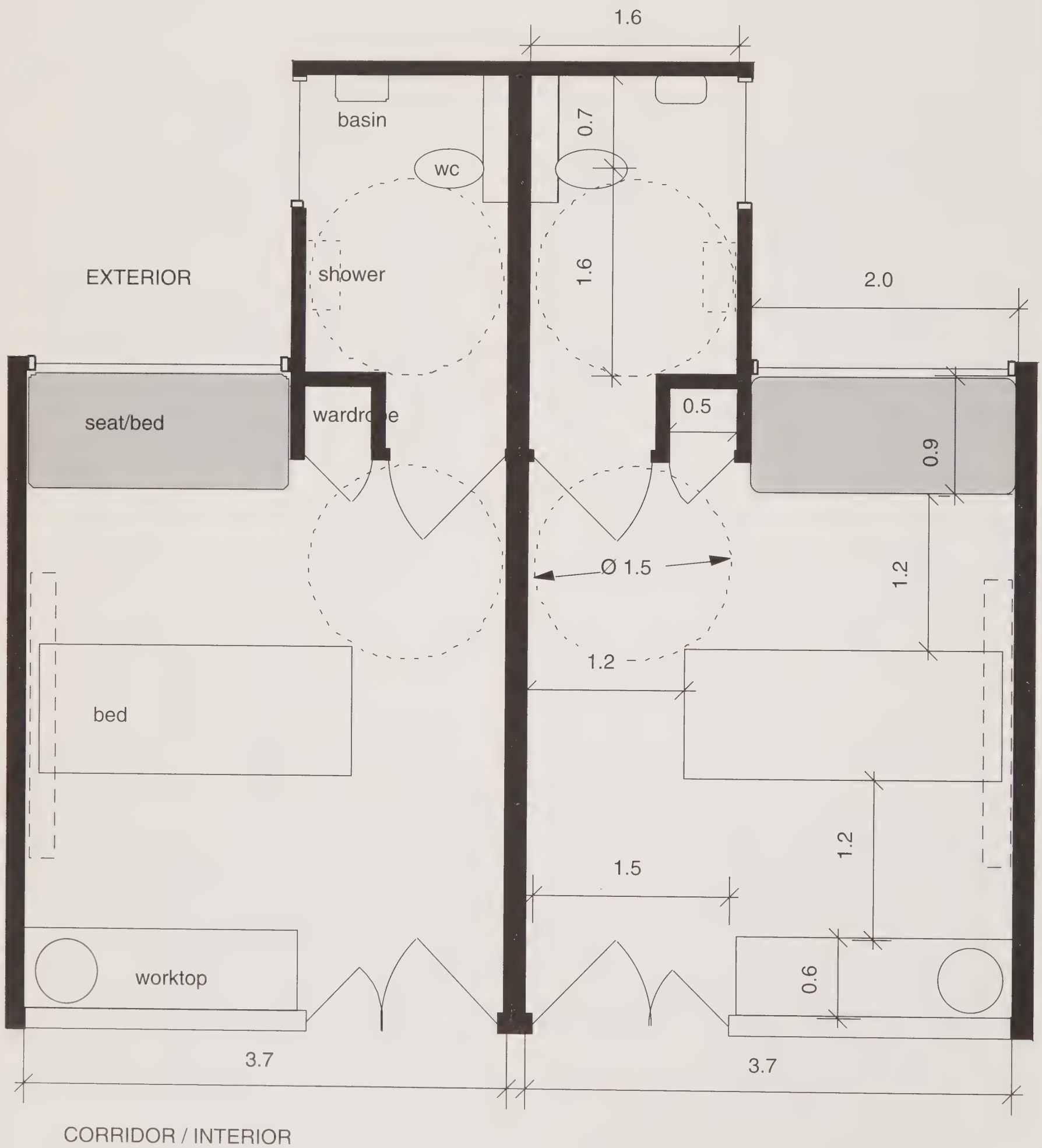


Single room
HBN 04 1997
area (excl ensuite) 16.88m^2



Layout of two single-bed rooms with ensuite bathroom

9.16 This layout shows a pair of single-bed rooms configured with external ensuite facilities. It illustrates **the most efficient layout** in terms of activity space, observation and circulation.



10. Ward design evaluation

"The main objective of ward design is to balance the patients' need for privacy, quietness and attention with nursing staff need for convenience, economy of movement and easy observation."
– ASHSA Report No. 58, 1986

10.1 The Nuffield report of 1955 was followed by a number of studies on ward design in both the UK and abroad, the most recent comprehensive one being reported by the Australian Studies in Health Services Administration (ASHSA) in 1986 "Evaluating Hospital Designs in Use". More recent research has considered the whole hospital environment and the reconfiguration and re-engineering of acute services overall.

10.2 The ASHSA study used a methodology similar to the Nuffield working party to review studies which had taken place in the interim as a basis for their own evaluation exercise.

10.3 A summary of findings from the ASHSA evaluation of 27 ward designs showed the subtle balance between time, activity and space:

1:

- The larger the area per bed in a room, the lower the travel component as more equipment can be brought to and stored at the bedside.
- The higher the degree of compartmentalisation, the greater the amount of time spent in travel and supportive activities in relation to staffing activities.
- Designs which decrease travel time spent by providing a greater number of support facilities close to the bedside result in time saved being reallocated to support activity rather than to patient contact activities.

2:

- Increasing the floor area allocated to bed areas increases the percentage of time spent on patient-specific activities.

3:

- The two key factors in determining the overall size of in-patient accommodation are the proportion of floor area allocated to bedrooms and the number of beds in the staffing unit.
- Mean area per bed varies from 18.6m^2 in the Nightingale ward to 23.8m^2 for a single-corridor ward.

The ASHSA review concluded that:

- Few studies agree that one particular ward layout is the most effective for the efficient operation of staffing units.
- In the Australian context acute in-patient accommodation would consist of 28 – 32 bed units containing up to six single-bed rooms with two separate day rooms.
- Net mean floor area of a unit should be between 25 – 28m^2 per bed.
- Nursing workload studies showed that the factor with the greatest effect on nursing activity patterns was the location of support service rooms.
- With an inherent facility for adaptability, simple designs become obsolete less quickly than complex ones.

10.4 Some of the detailed findings from the research are given below.

Size of unit

10.5 Koumens (1963) suggested that centralised wards were less efficient than small units grouped around nurses sub-stations with small nursing teams. He suggested that nurse travel distances would be significantly reduced by locating sluicing facilities close to the patient rooms, by providing meals on trays from trolleys and employing "nurservers" for supply and disposal.

Bed area

10.6 Evaluation of the Falkirk ward (SHHD Report, 1969) found that in comparison to other contemporary British designs it was generous in area (28.1m^2), but that the higher space was justified by more amenity for patients and greater convenience for staff. Four-bed wards were preferred to six-bed wards despite the 20% increase in space. Internal glazed partitions assisted in the observation of patients and added to the sense of space.

Shallow or deep ward planning

10.7 In 1970 a comparative evaluation of single- and double-corridor designs for Swindon and High Wycombe hospitals acknowledged that the deeper plan layout was more costly to run but possessed inherent advantages

over the linear layout due to the tighter grouping of beds around the staffing station. Main complaints related to heating and ventilation, lighting glare, noise disturbance and lack of privacy in mixed sex wards.

Shape

10.8 In the USA between 1960 and 1978 a number of ward design studies compared ward shape and layout for staff travel distances and staff – patient contact. The comparison of rectangular, circular and triangular designs is of particular interest. One study of 12 wards at Rochester Methodist Hospital, USA by Trites et al (1970) of different shape, size and bed mix specially built for evaluation showed that nurses spend more time with patients and less in travel in the circular wards, with an overall preference for circular wards. Lippert (1971 and 1972) concluded that a circular 12-bed unit reduced nurse travel to about half that of a 12-bed rectangular unit and that random sequence tours were a better indicator of "travel efficiency".

10.9 These studies which concluded that circular layouts were more efficient in terms of travel and increased patient-nurse contact were challenged by others which concluded that the same operational benefits could be obtained in rectangular units which were cheaper and easier to build and more adaptable in use. Later studies preferred a triangular layout for single-bed room accommodation which maximised patient privacy and produced economies both in terms of staff travel distances and construction costs.

Number of beds per room

10.10 In their study, Freeman and Smedley (1968) concluded that two-bed wards had lower traffic costs then either one- or four-bed room designs with the lowest construction costs for a single-corridor four-bed room design. A quick review has found the two-bed room, said to be popular in Europe, frequently only accommodates one patient at a time. This will be the subject of a later document.

Design efficiency

10.11 Bobrow (1978) compared 12 ward layouts in order to establish an "Efficiency Ratio", measuring and comparing ten features which related to the proportion of single-bed rooms, floor areas and travel distances. A ward design with a larger circulation space in relation to bed space was considered less efficient than one where the circulation was proportionally lower.

10.12 The Bobrow analysis showed that:

- wards with the larger number of beds per unit tend to be more efficient;
- non-rectangular layouts have 30% shorter mean walking distances than rectangular layouts;
- there is no relationship between the proportion of single-bed rooms and mean walking distance;
- mean circulation area is 30% in rectangular units compared to 36% in non-rectangular units;
- mean floor area per bed for rectangular units is 28.1m^2 compared to 32.3m^2 for non-rectangular units;
- building costs per m^2 in rectangular units tend to be more economical;
- high floor areas per bed and low mean walking distances are associated with a high proportion of floor area that is circulation area;
- high mean walking distances are weakly associated with larger numbers of beds in each unit;
- in general the larger the bed space area the lower the walking distance per bed.

10.13 Natural and artificial lighting, temperature, ventilation and air movement are of paramount importance in achieving a high quality of environment and comfort for the ward users.

11. Impact of the environment on patients

11.1 There has been an accumulating mass of information drawn from research studies and ad hoc surveys on the impact of the environment on hospital patients. A sample drawn from a literature review is presented here.

General environment

11.2 Goffman (1961) described in detail the detrimental effect that a warehousing hospital design and function had on psychiatric patients and extrapolated that the hospital environment had a crucial influence on the mental health and well-being of all patients.

11.3 Goldsmith and Miller (1980) urged that the hospitals of the future be designed to reflect a homely environment – instead of a warehousing one, which to them seemed so widely evident. They noted that the rapid advances in medical knowledge and technology had dramatically increased the number of admissions for acutely ill patients in the US, but they also hypothesised that these rapid technological advances would decrease, the patient's length of stay in an acute hospital over the next decade. Goldsmith and Miller were scathing in their criticism of the design of the contemporary health facilities in the US, suggesting "it was an outdated model of interaction" between the carers and the patients and that it is no longer necessary "to retain custody". They commented that some of the buildings under construction "seemed deliberately designed to render insignificant those who used them" with some looking like "gigantic alien space craft".

11.4 Winkel and Holahan (1985), psychologists, suggested that the satisfactory process and outcome of treatment involves more than clinical interventions and asserted that "care delivery is embedded within the hospital's broader physical and social environment whose organization and characteristics may be expected to affect the course of treatment" (Ibid 1985:12).

11.5 They were particulary interested in the sources that patients use to gather necessary information to cope. A crucial source is the non-verbal cue that patients obtain from the physical and social environment. Overcrowding, lack of privacy, disruption of personal routine, excessive noise, and inappropriate room temperature all lead to loss of empowerment and a subsequent increased dependency on the staff who appear to and in many cases do, control the environment. The authors believed that the potential conflict which arises from this sensory overload and loss of empowerment should not be underestimated. A further tension may be experienced between the "efficiency needs of care providers and the social psychological needs of recipients". A key element of care should be in the form of primary prevention of stress through the designing of a hospital environment which is people-centred.

Stressors

11.6 In 1977 Volicer et al examined stress factors from a menu of 49 items identified by adult medical and surgical patients. They concentrated on psychosocial stressors which they believed were evident in hospitalised patients.

11.7 The results indicated that the highest stressor cluster was that of "unfamiliarity of surroundings". The statements within this cluster comprised having a stranger sleep in the same room; sleeping in a strange bed; having strange machines around; being woken up in the night; unusual smells; unusual noises; room too hot or too cold; tasteless food; and being cared for by unfamiliar people. The second highest cluster of stressors was that of "loss of independence". The statements within this cluster included other patients having too many visitors; other patients being overbearing and noisy.

11.8 Malkin (1992) examined the factors which create a healing effect. Amongst those identified are those of enhancing privacy and dignity, the prevention of intrusion by others and empowering individuals by giving them as much control as possible over their own environment. Like Volicer et al (1977), Malkin found that patients reported that having strangers sleep in the same room was an extremely stressful experience. Intrusions into an individual's territorial space was perceived as stressful whereas invasion of the patient's personal space by care-givers was not. This confirms the earlier findings of Allekian (1973) and Williams (1988).

Privacy and dignity

11.9 One of the most taxing problems for patients and staff alike is trying to maintain privacy and dignity. In an open ward of any configuration, any conversation, any clinical intervention and any action on the part of the patient can be overheard by anyone in the vicinity. Frequently, flimsy curtains pulled perfunctorily around

the bed space are the only physical barrier that can be offered to the patient.

11.10 The Disability Discrimination Act (1995) also has implications for practice and for future planning as it states that people who have sensory difficulties must be afforded the same level of privacy as the rest of the hearing and sighted population. The demographic projections indicate that there will be a significantly greater number of elderly people within the next couple of decades, and so the problem of maintaining and respecting an individual's privacy will increase concomitantly.

11.11 Two thirds of the respondents to a questionnaire issued by one hospital trust in 1995 were female; 50% were in-patients, 50% were >50 years of age, and most had been in hospital more than once. Approximately 10% of these patients were also interviewed. The responses confirmed that there were differences of opinion regarding what constitutes a mixed-sex ward. Although most people were satisfied with the level of privacy they received in hospital, they were more likely to express disatisfaction after discharge, and many people (particularly females) said that they had come to expect a lack of privacy in hospital. Their lack of privacy related to a variety of issues, including bathroom facilities; inadvertant exposure; private conversations being overheard; too-flexible visiting hours; and being continually surrounded by people.

11.12 In a separate survey nearly 1,000 members of the general public completed a questionnaire in 1994 which sought their opinions on the hypothetical situation of their being admitted to a mixed-sex ward. All respondents were more than 15 years of age. The results confirmed the hypothesis that a significant number of people would object to the idea of being admitted to a mixed-sex ward, with the highest percentage of objections being made by people who were more than 65 years of age. Greater numbers of women objected than men, in all age groups. Although it could be argued that more people did not object to the idea of a mixed-sex ward (58%), it should be emphasised that the respondents were giving their opinions based on a hypothetical situation.

Visual perception/stimulation

11.13 Winkel and Holahan (1985) cited a study by Spivak (1967) which measured the altered visual perception of "normal, non-hospitalised persons" in hospital corridors which were decorated in glossy reflective paint, which creates shadows and alters the sharp outline of oncoming persons. This did not mean, however, that there should be no visual stimulation at all. An optimal level of visual complexity is favoured by most people. This includes changes in wall colour, texture and, where appropriate, pictures or photographs to add to the level of interest. Positive environmental stimulation was also considered to include a view from a window; an available television set; access to differing reading matter and unrestricted visiting from family and friends. These factors which contribute to a positive environment can of course also contribute to a negative one if a patient is unable to turn off or choose the programme on the television or if it is another patient's relatives who visit on an unrestricted basis (Malkin 1992, Ulrich 1991, Draper and Shani 1993).

11.14 Ulrich expressed a particular interest in visual stimulation and had previously collected data which demonstrated that a lack of windows caused stress, anxiety and even psychosis in critically ill patients (Keep et al 1980).

11.15 A sample of patients who had undergone a cholecystectomy required less analgesia and had a more favourable recovery with a shorter length of stay, if they had enjoyed a window view of nature when compared with the recovery of a similar group of patients who had looked through a window at a brick wall (Ulrich 1984).

11.16 Ulrich and Lunden (1990) measured the post-operative health of 166 patients who had undergone open heart surgery. Some patients were exposed to pictures on the wall of their rooms which were of a landscape design while others saw an abstract design. A control group had no pictures to view. The group who viewed pictures of a natural view produced the lowest level of anxiety whilst the group who saw only the abstract painting produced the highest anxiety levels.

11.17 The three studies completed by Ulrich are of interest although the methods used to measure the anxiety levels are open to question, as critically ill patients have an extremely variable and frequently unpredictable recovery profile. The number of variables in this study may make the results somewhat unreliable. Nonetheless, the point is well made that pleasant visual stimulation may enhance psychological well-being.

Noise

11.18 Ogilvie (1980) measured the noise levels at night on a surgical unit in a UK hospital and recorded excessive noise levels. A number of authors have raised the issue of noise in hospitals, particularly during the night (Kemp 1984, Carter 1985, Closs 1988a, 1988b). A recent pertinent study completed by Southwell and Wistow (1995) examined whether patients' need for sleep was being met in three district hospitals in the UK. The three hospitals between them contained just over 2,000 beds. Patients and nurses were asked to fill in a questionnaire.

The response rate of 75% for the patients and 84% for the nurses indicates a high level of interest in the study – in total 454 patients and 129 nurses completed the questionnaire. Approximately 300 of the patients surveyed were on either a medical or a surgical ward.

11.19 Both the patient group and the nurses identified "patients making a noise" – the most frequent cause of disturbance – as the first causal factor. "Other patients needing attention" was also ranked very highly by both groups. Nearly all causes of disturbance could be linked to the unusual environment and the problems of sharing sleeping accommodation with others. Patients on the surgical wards were disturbed the most frequently (79% of the 149 patients were disturbed at least once during the night). On the medical wards 63% of the 153 patients were disturbed at least once a night. Southwell and Wistow considered the type of ward configuration and found that converting the Nightingale ward into smaller bays has no effect on noise reduction. Fewer patients in bays reported a good nights' sleep than those on either a Nightingale ward or those in a single-bed or double-bed room. It would appear that a ward converted into bays is the noisiest option. As Southwell and Wistow concluded "the findings of this study are unequivocal". Patients do not get as much sleep as they need or they would like.

12. Suitability of the single-bed room

12.1 The following section is an extract from a literature review on the use of the single-bed room for hospital in-patients.

12.2 Single-bed room accommodation remains relatively rare in the UK National Health Service, although it is common practice in the private sector. In the USA and some of the European countries there are more single-bed rooms than multi-bedded areas in acute care hospitals.

12.3 In summary single-bed rooms provide: complete flexibility of use for patients of either gender, any age, and most clinical conditions including source isolation. This increases the opportunity for shortening turnover intervals and thus raises annual average occupancy. Single rooms offer privacy for treatment and personal activities, confidentiality of discussion, quiet for sleep and rest. Patients can control the environment, have visitors without disturbing others and can venture the short distance from bed to bathroom in relative safety without having to negotiate past other patients and staff and the general paraphernalia of a busy acute area. When the room is used to hold the necessary supplies for a patient's daily care needs, staff travelling distance and time is reduced.

12.4 Arguments presented against the single-bed room are: the increase in the overall floor area, difficulty in observing patients and that patients feel lonely. There is some degree of validity to these arguments. However, the balance of the evidence indicates that the advantages outweigh the disadvantages.

The discussion...

12.5 In 1908 a Charity Hospital in the USA (The Kings Daughter's Hospital in Texas) decided that all patients should be accommodated in single-bed rooms, while in 1910 the superintendent of the Presbyterian Hospital in Chicago observed that the introduction of single-bed rooms with ensuite facilities for every patient, "not only provides comfort but... allows the occupancy of beds at all times". He also concluded that with each patient occupying a single-bed room, there would be no need for treatment rooms, general bathrooms and lavatories, and that linen stores on each floor could be abandoned providing that there remained a central supply room (Nuffield 1955). The use of single-, double- and four-bedded rooms rather than multi-bedded wards has been the norm in the USA for many decades.

12.6 In 1955 the Nuffield Working Party explored options to offer quality care to individuals. One of these was the adoption of single-bed room accommodation. The rationale was that patients susceptible to infection and liable to infect others; patients requiring special attention and treatment on a 24-hour basis; seriously ill or terminally ill people and their visitors; should be offered complete privacy, as many of these patients disturb or are disturbed by, others. The working party calculated that if the number of single-bed rooms on each ward was increased the efficiency of provision and bed occupancy would increase concomitantly.

12.7 In more recent years many authors have turned their attention to the notion of single-bed room accommodation for all patients in the acute care sector (Volicer et al 1977; DHSS 1978; Ruga 1983; NHS Estates 1990; Dix 1990; Ulrich 1991; Martin 1991; Dixon et al 1992; Malkin 1992; Draper and Shani 1993; Goldsmith 1993). The consensus of opinion would seem to suggest that the advantages for the patient outweigh the disadvantages, and indeed there are many positive outcomes for the healthcare provider.

12.8 There is clear agreement between authors that certain categories of patients benefit greatly from being cared for in a single-bed room, in accordance with the views expressed in the 1955 study. These include very ill or dying patients (Green 1984); Dixon et al 1992; NCEPOD 1995); patients who are noisy or confused (Green 1984); and those who need to be isolated for clinical purposes (Green 1984). Current trends in healthcare mean that many patients in the acute care sector would fit at least one of the above categories. Those who are admitted as an in-patient either in an emergency or electively, will fall into a very ill or highly dependent category for a short period.

12.9 Martin (1991) believed that in the UK the use of single-bed rooms in the public healthcare sector, was perceived as being for patients in amenity beds or for isolation purposes. The ward is one of the few places within a hospital which is open twenty fours per day (Martin 1991) and it is on the ward that patients form their first and lasting impressions. Martin asserted "as wards are fundamental to the success of a hospital, the role played by the single-bed room could become the most important factor in the success of the ward". Martin recommended that at least 50% of hospital beds should be accommodated in single-bed rooms. He calculated that single-bed room accommodation would require more proximal nursing stations and that "state of the art"

communications would be essential. Martin surmised that if every patient was accommodated in a single-bed room, bed occupancy would increase.

12.10 Green (1984) calculated that if an increased number of single-bed rooms were introduced the travel time for nurses would increase only if practice did not adapt by examining the organisation and planning of working practice; and that from a nursing point of view the increase in the flexible use of beds in single-bed rooms would outweigh the disadvantages.

12.11 In a previous study it was found that most nurses preferred to carry out treatment and care in single-bed rooms or a designated treatment room (Green and Heath 1983). Another important issue for the nursing staff was the introduction of open visiting hours – there were concerns that patients were not getting enough rest as they were being constantly disturbed by other patients' visitors. Seventy percent of the sample, however, believed that a four bedded room was the best option for encouraging patient socialisation. Nearly all of the respondents wanted ensuite facilities in whichever configuration of rooms was used.

12.12 Several authors have emphasised the need to consider the increased usage and flexibility of beds of single-bed room accommodation in any cost benefit analysis. McLaughlin (1968), cited by Martin, found that bed occupancy in single-bed rooms was between 94 – 97%; that patients were transferred less frequently; and that there were fewer patient incidences, such as medication errors. McLaughlin also concluded that single-bed rooms were more appropriate for clinical emergencies. Burrough (1976), also cited by Martin, measured the bed occupancy when single-bed rooms were introduced and found that it increased from 75 – 90% and that the patients' average length of stay decreased from 10.2 to 7.5 days.

13. Design options evaluation tool

13.1 This audit tool has been designed by Social and Market Strategic Research Ltd (SMSR) for this publication, **and is untested**. NHS Estates would welcome feedback from hospital design teams on its usefulness and the scores which have resulted.This data would assist SMSR in evaluating the effectiveness of the audit tool.

The tool

13.2 The extent to which a design proposal contributes to the objectives in the business case to be resource effective, to achieve health gain and to be people-centred may be assessed by considering the issues given in the chapter on the desirable environment.

13.3 For each issue – space; suitability; privacy; choice comfort, control – a number of criteria have been identified and sorted by relative importance. These can be scored, weighted and a total generated. This enables a team to identify the strengths and weaknesses of different design proposals. It makes explicit the features where there are compromises and therefore provides a basis for informed decisions on the preferred design.

Using the tool

13.4 The criteria may be scored on a scale of one to five, one being the lowest and five the highest, in respect of their contribution to each relevant objective. Some criteria are not relevant to each of the three objectives and are therefore not scored under every objective.

13.5 After each criterion is scored a sub-score total should be made. Sub-scores A and B should be weighted by the factor shown and the value generated entered into the boxes. The sums of the weighted values are entered into the boxes at the foot of the page and transferred to the summary sheet. They may also be totalled to give scores for each issue, on the issue page.

13.6 The transferred scores can then be sub-totalled and totalled to give a final score on the summary sheet.

13.7 The final score of each design proposal can be used to evaluate one against another.

NB It should be noted that the maximum scores per criteria/issue are not designed to balance.

Issue: Space

Criteria	People Centred	Objective: Health Gain	Resource Effective
Storage for patients' medicines, clinical supplies and personal belongings to be kept at the bedside	❶ ❷ ❸ ❹ ❺		❶ ❷ ❸ ❹ ❺
Storage for more general frequent use goods to be held close to the point of use			❶ ❷ ❸ ❹ ❺
For the prevention/containment of infection particularly MRSA; TB; by hand-washing facilities in every clinical space and by sufficient single rooms		❶ ❷ ❸ ❹ ❺	❶ ❷ ❸ ❹ ❺
Sub-score A			
Weighting Factor x 3			
Alcoves for the permanent holding of emergency trolleys which need to be readily available, and for temporary parking of trolleys e.g. food /linen, to avoid blocking circulation	❶ ❷ ❸ ❹ ❺	❶ ❷ ❸ ❹ ❺	❶ ❷ ❸ ❹ ❺
Space around a bed to accommodate all the bedside activities	❶ ❷ ❸ ❹ ❺	❶ ❷ ❸ ❹ ❺	❶ ❷ ❸ ❹ ❺
Sub-score B			
Weighting Factor x 2			
Storage of bulky equipment readily accessible			❶ ❷ ❸ ❹ ❺
Close access to beverage and rest areas for staff	❶ ❷ ❸ ❹ ❺	❶ ❷ ❸ ❹ ❺	❶ ❷ ❸ ❹ ❺
Close access to clinical education and training area	❶ ❷ ❸ ❹ ❺		❶ ❷ ❸ ❹ ❺
Local storage of personal items for staff	❶ ❷ ❸ ❹ ❺		
Sub-score (no Weighting Factor)			
TOTAL SCORES			

Key ❶ = Very poor ❷ = Poor ❸ = Average ❹ = Good ❺ = Excellent

Issue: Suitability

Criteria	People Centred	Objective Health Gain	Resource Effective
Services at the bed for clinical and personal activities eg medical gases; lighting; TV; communication	❶ ❷ ❸ ❹ ❺	❶ ❷ ❸ ❹ ❺	❶ ❷ ❸ ❹ ❺
The means for emergency and non-emergency voice communications for all users (patients & staff)	❶ ❷ ❸ ❹ ❺	❶ ❷ ❸ ❹ ❺	❶ ❷ ❸ ❹ ❺
For different and varying spans of team management to allow for (eg) variations in dependency, different day/night management.			❶ ❷ ❸ ❹ ❺
Sub-score A			
Weighting Factor x 3			
Quiet to enable a patient to rest and sleep by day as well as by night.	❶ ❷ ❸ ❹ ❺	❶ ❷ ❸ ❹ ❺	
Short walking distance between a bed and the nearest WC	❶ ❷ ❸ ❹ ❺		
Computer terminals at every point of clinical and management activity to enable immediate input/access to patient information without unnecessary staff movement	❶ ❷ ❸ ❹ ❺	❶ ❷ ❸ ❹ ❺	❶ ❷ ❸ ❹ ❺
Opportunity for patients to be entertained /diverted without upsetting others	❶ ❷ ❸ ❹ ❺		
A pleasing ambiance with locations sufficiently identified and differentiated to enable people to know where they are	❶ ❷ ❸ ❹ ❺		
Maximisation of staff to patient contact time/minimisation of indirect patient care time	❶ ❷ ❸ ❹ ❺	❶ ❷ ❸ ❹ ❺	❶ ❷ ❸ ❹ ❺
Sub-score B			
Weighting Factor x 2			
For high throughput and high occupancy			❶ ❷ ❸ ❹ ❺
Sub-score (no Weighting Factor)			
TOTAL SCORES			

Issue: Privacy

Criteria	People Centred	Category Health Gain	Resource Effective
The facility for all treatment to be carried out unobserved and without being overheard	❶ ❷ ❸ ❹ ❺		
WCs and washing facilities which are enclosed for privacy with access not overlooked by other patients	❶ ❷ ❸ ❹ ❺		
Sub-score A			
Weighting Factor x 3			
Discrete spaces where private discussions including telephone calls cannot be overheard.	❶ ❷ ❸ ❹ ❺		
Sub-score B			
Weighting Factor x 2			
The provision of single-sex zones	❶ ❷ ❸ ❹ ❺		
Sub-score (no Weighting Factor)			
TOTAL SCORES			

Issue: Choice Control Comfort

Criteria	Category: People Centred	Category: Health Gain	Category: Resource Effective
Individual control of lighting, temperature, outlook	❶ ❷ ❸ ❹ ❺	❶ ❷ ❸ ❹ ❺	
Sub-score B			
Weighting Factor x 2			
Choice of accommodation and space for patients to be by themselves or in company	❶ ❷ ❸ ❹ ❺		
Easy open access to beverages	❶ ❷ ❸ ❹ ❺		❶ ❷ ❸ ❹ ❺
Sub-score (no Weighting Factor)			
TOTAL SCORES			

Design options evaluation tool

Score Sheet

	PEOPLE CENTRED	HEALTH GAIN	RESOURCE EFFECTIVE
SPACE			
SUITABILITY			
PRIVACY			
CHOICE, CONTROL, COMFORT			
SUB-TOTALS			

TOTAL SCORE

14. Useful reading

Designers should create an environment that will help people feel at ease, be conducive to efficient working, and contribute to staff morale. Particular note should be taken of **Health Buildings in the Community** by NHS Estates; reference should also be made to **Better by Design** and **Environments for quality care** (also by NHS Estates), and **Demonstrably Different** and **First impressions, lasting quality** by the Department of Health.

The segregation, storage and safe disposal of waste should comply with the guidance given in the Health and Safety Commission – Health Service Advisory Committee **Safe disposal of clinical waste**, HMSO 1992.

Statutory and other requirements, including Crown immunities

The Note takes account, as far as possible, of all statutory and other requirements in force at the time of publication. However, health authorities and trusts are reminded of their responsibility for ensuring compliance with all relevant statutes, regulations, codes and standards.

With the general removal of Crown immunity, building and planning law are legally enforceable on the NHS. Guidance on the removal of Crown immunity is given in **Circular HN(90)27/LASSL (90)15** (in Wales **WHC(91)4**, and in Scotland **NHS Circular 1991(GEN)1**), in respect of a wide range of legislation. The equivalent in Northern Ireland is **ME ESD letter reference 15781/92 Estate Requirements**, issued 8 November 1991.

Building components

The Building Components Database consists of a series of NHS Estates **Health Technical Memoranda (HTMs) 54 – 70**, which provide specification and design guidance on building components for health buildings which are not adequately covered by current British Standards. No firms or products are listed.

Those particularly useful for planning in-patient accommodation are:

HTM 48 – Telephones.

HTM 55 – Windows.

HTM 56 – Partitions.

HTM 58 – Internal doorsets.

HTM 61 – Flooring.

HTM 65 – Health signs.

Engineering

The engineering services should be commissioned in accordance with the validation and verification methods identified in the latest HTMs. Engineering sevices for which a specific HTM is not currently available should be commissioned in accordance with **Engineering commissioning** published by the Institute of Healthcare Engineering and Estate Management (IHEEM). Flow measurement and proportional balancing of air and water systems require adequate test facilities to be incorporated at the design stage. Guidance is also contained in a series of commissioning codes published by the Chartered Institute of Building Services Engineers (CIBSE).

HTM 60 – Ceilings

HTM 63 – Fitted storage systems.

HTM 64 – Sanitary assemblies.

HTM 66 – Cubicle curtain track.

HTM 68 – Duct and panel assemblies.

HTM 69 – Protection.

HTM 2007 – Electrical services: supply and distribution.

HTM 2011 – Emergency electrical services.

HTM 2014 – Abatement of electrical interference.

HTM 2015 – Bedhead services.

HTM 2022 – Medical gas pipeline systems.

Recommended spatial requirements for mechanical, electrical and public health engineering services are contained in **HTM 2023 – Accommodation for Plant and Services**. Reference is also made in HTM 2023 to the **Construction (Design and Management) Regulations**.

HTM 2025 – Ventilation in healthcare premises: design considerations.

HTM 2027 – Hot and cold water supply, storage and mains services (in preparation). In Scotland, **Scottish Hospital technical Note 2: Domestic Hot and Cold Water Systems for Scottish Healthcare Premises**.

The limits and means of control advocated in **HTM 2045 – Acoustics** should provide an acceptable acoustic environment.

Health Guidance Note – "Safe" hot water and surface temperatures. In Scotland, the original **Code of Practice, The control of legionellae in healthcare buildings** was issued under cover of **DGM (88)50**.

Guidance for engineering commissioning is contained in a series of commissioning codes published by the Chartered Institute of Building Services Engineers (CIBSE). In Scotland, the building and its engineering component should be commissioned in accordance with **Scottish Hospital Technical Note 1: Post Commissioning Documentation for Health Buildings in Scotland**.

CIBSE Lighting Guide LG2 – Hospitals and Health Care Buildings.

CIBSE Lighting Guide LG3 – Areas for visual display terminals.

BS 7671: Requirements for Electrical Installations. IEE Wiring Regulations. 16th Edition (and subsequent amendments).

The electrical suppy connections to all medical electrical equipment should comply with **BS EN 60 601-1-2: 1993**.

BS 5266: Emergency Lighting.

EC Directive on Electromagnetic Compatibility (89/336/EEC as amended by 91/263/EEC and 92/31/EEC). This Directive has been implemented in UK law by the **Electromagnetic Compatibility Regulations 1992 (SI No 2372)**, October 1992.

HC (77) 16 (in Wales **WHN (77)32**) and guidelines for the **Safe and Secure Handling of Medicines**.

Scottish Home and Health Department: **Guidelines for the Safe and Secure Handling of Medicines**, issued with the **NHS Circular No 1988 (GEN) 33**.

BS 2881: 1989(1994) Specification for cupboards for the storage of medicines in health care premises. *(AMD 6919, 4/92)*

The Medicines Act 1968.

Health Building Notes (HBNs)

Health Building Notes applicable to in-patient accommodation are:

SHPN/HBN 45 – External works for health building. NHS Estates, HMSO 1992.

SHPN/HBN 40 Vols 1 – 4 – Common activity spaces. NHS Estates, HMSO 1995.

HBN 12 Sp 4 – Opthalmology. 1996.

HBN 22.Sp 1 Trauma care and minor injury. NHS Estates, HMSO 1996.

HBN 36 – Local healthcare facilities. NHS Estates, HMSO 1995.

HBN 46 – General medical practice premises. NHS Estates, HMSO 1992.

Information management and technology

The information systems selected should offer a wide range of facilities, and be consistent with local and NHS IM&T strategies, which may be obtained from the Publishing Department, DH Distribution Centre, PO Box 410, Wetherby, LS23 7LN (tel: 01937 840250/2). A national overview of the trend towards networking and data communication networking systems is contained in **A Strategy for NHS-wide networking** which may be obtained from the NHS Executive. More detailed guidance on local area networks (LANs) is contained in the **NHS IT Standards Handbook Volume 2**, which may also be obtained from the NHS Executive. In Northern Ireland readers should consult HPSS Directorate of Information Systems, Centre House, 79 Chichester Street, Belfast BT1 4JR.

Capital Investment Manual

The Capital Investment Manual (England and Wales) contains the NHS Executive's procedural framework governing the inception, planning, processing and control of individual health building schemes. Approval from the NHS Executive for business cases will depend on how they intend to carry out the mandatory tasks. The Manual gives guidance on the technical considerations of the full capital appraisal process and provides a framework for establishing management arrangements to ensure that the benefits of every investment are identified, realised and evaluated.

Capital investment manual:

Overview. NHS Executive, HMSO 1994.

Project organisation. NHS Executive, HMSO 1994.

Private finance guide. NHS Executive, HMSO 1994.

Business case guide. NHS Executive, HMSO 1994.

Management of construction projects. NHS Estates, HMSO 1994.

Commissioning of a health care facility. NHS Executive, HMSO 1994.

IM&T Guidance. NHS Executive, HMSO 1994.

Post project evaluation. NHS Executive, HMSO 1994.

Capital investment manual (HSS(PDD)4/95). Northern Ireland Health and Social Services Department, 1995.

Scottish Capital Investment Manual:

Overview. NHS in Scotland, Management Executive, HMSO 1997.

Project organisation. NHS in Scotland, Management Executive, HMSO 1997.

Private finance guide. NHS in Scotland, Management Executive, HMSO 1997.

Business case guide. NHS in Scotland, Management Executive, HMSO 1996.

Management of construction projects. NHS in Scotland, Management Executive, HMSO 1997.

Commissioning of a health care facility. NHS in Scotland, Management Executive, HMSO 1997.

IM&T Guidance. NHS in Scotland, Management Executive, HMSO 1996.

Post project evaluation. NHS in Scotland, Management Executive, HMSO 1997.

People with a disability

It is essential to ensure that suitable access and facilities are provided for people who have problems of mobility or orientation or other special needs. This category includes, besides people who are wheelchair-bound, those who for any reason have difficulty in walking, those with a sensory handicap such as visual or hearing impairment, and those whose first language is not English.

Readers should refer to **HFN 14 – Disability access**.

Project teams are reminded of the need to comply with the provisions of:

a. **The Chronically Sick and Disabled Persons Act 1970** and **The Chronically Sick and Disabled Persons (Scotland) Act 1972**;

b. **The Chronically Sick and Disabled Persons (Amendment) Act 1976**;

c. **The Disabled Persons Act 1981**;

d. **The Disabled Persons (Services, Consultation and Representation) Act 1986**;

e. **Department of the Environment Approved Document M (1992) to The Building Regulations 1991**;

f. **The Disability Discrimination Act 1995**.

Project teams in Northern Ireland are reminded of the need to comply with the provisions of:

a. **The Chronically Sick and Disabled Persons (Northern Ireland) Act 1978**;

b. **The Disabled Persons (Northern Ireland) Order 1982**;

c. **The Disabled Persons (Northern Ireland) Order 1989**;

d. **Technical Booklet to the Building Regulations (Northern Ireland) 1994**.

Attention is drawn to **BS 58010: 1979 Code of Practice for Access for the Disabled to Buildings** (under review). One of the effects of the 1981 Act is to apply this British Standard to premises covered by the 1970 Act, which includes those open to the public. Practical guidance for complying with The Building Regulations is issued by the Department of the Environment under **Approved Document M: Access and facilities for disabled people**. (For Scotland, attention is also drawn to recent amendments to **Part T of the Technical Standards for compliance with the Building Standards (Scotland) Regulations 1990**, which extend the specific requirements for access and facilities for disabled people – which previously applied only to the ground floor – to the upper floors of all buildings except dwellings.)

Smoking

NHSME circular HSG (92)41, entitled **Towards smoke-free NHS premises**, promulgated Government policy as set out in the **Health of the Nation** White Paper, and required NHS authorities and provider units to implement policies so that the NHS became virtually smoke-free by 31st May 1993. The circular advised that a limited number of separate smoking rooms should be provided, where necessary, for staff and for patients who cannot stop smoking. In addition, **Scottish NHSME circular MEL(2)24** referred to further separate guidance recommending that consideration be given on how to ventilate adequately any such smoking rooms. Readers in Northern Ireland should refer to **ME Circular HSS (OP1) 2/93 Towards Smoke-free Premises in the HPSS**, issued 10 March 1993.

Cost Allowances

The **Departmental Cost Allowances (DCAG)** which reflects the building and engineering requirements of new-build in-patient accommodation associated with this HBN are promulgated in the **Quarterly Briefing** (issued separately under cover of an Estates Policy Letter) on behalf of the NHS Executive. In Northern Ireland Quarterly Briefing is issued under cover of a Professional Estate Letter.

No allowances for on-costs which may arise are included in the DCAG, as these are determined by local circumstances. Neither are VAT, building and planning fees or local authority charges included.

Departmental cost allowance guides (DCAGs). Published in Quarterly Briefing, available from NHS Estates.

Equipment

Equipment cost allowance guides (ECAGs). Listed in Concise 4 Database, available from NHS Estates.

Equipment is categorised into four groups:

Group 1:

Items (including engineering terminal outlets) supplied and fixed within the terms of the building contract;

Group 2:

Items which have space and/or building construction and/or engineering service requirements and are fixed within the terms of the building contract but supplied under arrangements separate from the building contract;

Group3:

As Group 2 but supplied and fixed (or placed in position) under arrangements separate from the building contract;

Group 4:

Items supplied under arrangements separate from the building contract, possibly with storage implications but otherwise having no effect on space or engineering service requirements.

Group 1 items are provided for in the Departmental Cost Allowance associated with this Note. The Department of Health Equipment Cost Allowance Guide (ECAG) specifies a sum of money for the functional unit for Groups 2 and 3 but does not cover Group 4.

Works Guidance Index

This volume indexes under subject references most of the relevant guidance current at the time of publication.

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Other publications in this series

(Given below are details of all Health/Hospital Building Notes which are either published by The Stationery Office or in preparation. A Design Briefing System Notebook is available with Notes marked (*) – information is given within the Notebook on how it may be used. Information is correct at the time of publication of this volume.)

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